Inefficient Land Markets and their Causes
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Draft - needs some finishing. Still useful for course

Inefficient Land Markets and their causes

Notes by Mason Gaffney, 10 Sept 87, rev. 17 Nov 87

1. Efficiency means putting land to best use

Efficiency means putting land to its best use, measured by land rent, the excess of cash and service flows (henceforth just "cash flows") over capital costs of development and improvement. Capital costs are levelled out in standard ways not rehearsed here; so are variable cash flows.

Uniform returns on purchase prices, even if they occur (they don't), do not prove land markets to be efficient. Uniform returns result from arbitrage, and good capital markets, and capitalization.

Economists keep trying to fuse land with capital, but the causation between cost and cash flow is reverse. Capital formation causes capital to exist and therefore yield cash flow; land exists and yields a cash flow, and therefore has a purchase cost.

There is a worldwide market for capital, flawed to be sure, but quite operational. Capital flows tend to create a common, worldwide and industrywide rate of return on capital, based on the productivity of capital as demand and the reluctance to save as a limit on supply.

With this the rent of land has nothing to do, directly. There is no rate of return on creating land; no common level of land rents. Higher rents do not increase the return on investments and pull up interest rates; they are capitalized into higher land values, using the given interest rate which is determined by the supply of and demand for capital, not land.

Some economists seem quite blind to this point. Robert Barro has recently said of the stock market (which is an indirect real estate market): "The market is ... the best predictor of long-run economic activity. And the fact that it has been booming indicates that economic growth should continue to do well."

Barro seems to overlook any difference between assets in being, like land, and new assets. Thomas Downs and Patric Hendershott come nearer the mark: "The rise in stock prices follows from the heavier taxation of new capital and the resulting rise in returns on existing capital." Their choice of words may be less than crystalline but their evident meaning, as revealed in their article, is that given returns are capitalized

at a lower rate of interest. They include land with "existing capital". (NTJ XL 183)

If the return to capital rises in a place or an industry capital flows in until the rate of return on new investment falls to the common level. When land rents rise arbitrage pushes up land values, using the interest rate borrowed from the market for capital where it is determined. This creates an illusion of a return on land but it is a return only on buying, not building. The return comes first, the price derives from it.

If land rents do affect interest rates it is not by increasing the productivity of and demand for capital. It is likely to be the reverse: high asking prices for land can cut into and reduce the return to capital. In short, high building values increase the demand for investment; high land values reduce it. There could hardly be a more basic difference.

Whether high land values do or not reduce returns to investors depends on whether they are properly high -- i.e. they reflect the high productive value of land -- or overpriced, in a cost-push phenomenon. Overpushing building rentals does happen but vacancies result and correction is likely. Overpricing land titles often occurs but may go for years before it is recognized and corrected. (Demanding high ground rents in long term leases to builders is also common and has similar effects.) When this occurs it lowers the rate of return on building. Where the land is paid or contracted for up front and on fixed terms, the building only gets the residual.

High land values may also affect interest rates indirectly by reducing saving and the supply of capital. The existence of high land rents and values, like the ownership of slaves, tends to satisfy the need for accumulation of assets without any actual capital formation.

Monopoly illustrates the difference between uniform returns on purchase price, and efficient allocation. A monopoly is known to misallocate resources, but once the monopoly is established new buyers earn only a market return. (They used to call it watering the stock.)

Similarly with farm price supports, subsidized water delivered below cost, tariff protection, etc. ad inf.

Premature "rent-seeking" acquisitions may also yield individuals a market return and yet socially be premature. Investments to appropriate water rights, establish future zoning grandfatherhood, etc. are cases in point.

Killing Indians to acquire land was cited by Frank Knight as a productive investment like any other, but this is at best a

zero-sum game, and usually of course negative-sum. Killing Indians has lost its cachet, but today ... well, why open that box here?

Lending on collateral gets nearer the heart of the difference between land allocation and uniform returns. To the lender, charging a high rate on unsecured loans may yield him the same net return after losses as the lower rate he charges on secured loans. He calls it uniformity of returns, and many economists take the same viewpoint. But to the borrowers the rates are very different. And it is this difference that dominates land allocation; because the carrying cost of land is mainly interest.

Keynes and others have stressed the difference between true investment risk and lenders' risk. The former is an economic cost that should be considered; but the latter dominates the allocation of loans, and therefore the allocation of land. As Schickele put it, the basis of lending is not marginal productivity but collateral security.

Of course it also matters what all we include in the returns to land holding. The return is over time. Future time is conveniently and conventionally compressed into one current year by including appreciation thus: Yield = current cash flow (CF) plus appreciation (dL).

But little, and often none, of dL is under the landholder's control or influence. dL is given, exogenous, independent of current use. Yet only current use enters much into efficiency, properly defined. What the land market allocates is land's capacity to yield cash flow or ordinary income; but what it distributes includes dL. This distribution may interfere with efficient allocation.

2. Purchase price is history, immediately.

Because land is not produced, its purchase price is unrelated to efficiency. If it cost A $100k to build what B builds for $50k, that is inefficient per se. But if it cost A $100k to buy land comparable to what B buys for $50k, and they get the same net rents from it, that is efficient. Purchase prices are immediate history; use is what counts.

Now it is efficient for every holder to get uniform returns on the opportunity cost of land. But that is the same as getting comparable CFs from comparable lands. Relating it to a uniform P/e ratio (in this case, L/CF ratio is the notation being used) just intrudes an extra step.

3. Manifestations of inefficiency

Many facts of life lead one to suspect that land markets are seriously inefficient.

Urban sprawl is the best known. (When we look at other land markets we also find agricultural sprawl, mineral sprawl, forestry sprawl, water development sprawl, radio spectrum sprawl, etc., but here we limit the illustration to urban.)

Moreno Valley, CA, pushing 100,000 pop., is an hour-or-more's commute from Orange County where most of its people work. Any single accident chokes the freeway; every few commutes are slowed by an accident, unpredictably, so one must allow extra time or else be unreliable. Its summer climate is sweltering because inland. It is in a high-noise flightpath from March AFB. It is on a fault line. Its infrastructure is primitive and inadequate -- schoolchildren on shifts in portable classrooms, for example.

The human and cash cost is high of living with all those problems. Yet Orange County itself has much empty land still "ripening" (so they say) into urban use.

Question: if Moreno Valley is ripe, why is Orange County unripe? The big attraction of Moreno Valley, by common acclamation, is cheap land. Is cheap land riper than dear land? Or is the market failing? Resource economists have no trouble agreeing that low-cost, high-rent extractive resources should be used before high-cost, marginal ones, to avoid deferring rents. Is it different with urban land?

Higher land uses can pay rent for good locations from a surplus above costs. This same surplus can also be used to develop and utilize marginal land. Only then the rent is dissipated in waste. The Moreno Valley phenomenon, common to every American city today, manifests gross waste.

Another familiar manifestation of market failure is the high contrast of land use intensities so common in LDCs. These are often correlated with scale contrasts, and the two fused into one syndrome, but it is the intensity contrasts themselves which most clearly raise the likelihood of market inefficiency. Why does not land pass from the uncrowded to the crowded farms? Production economics and diminishing returns point to forces tending to equalize factor proportions. Why don't these forces prevail in LDCs?

Actually, the LDC contrasts are duplicated here at home, if in less extreme form; it is simply more politic to find them at a distance. I once calculated that in Milwaukee 30% or so of the people reside on 3% of the land (measured by value); and at the

top, 10% on 50%. That is much more concentrated than national income, even though it refers to what is probably the least concentrated form of real property.

Landholding is near the heart of the undue concentration of wealth and economic power. Few assets are priced so high as land, relative to cash flow. Financing a purchase of land therefore presents an unusually high credit barrier to the builder, new businessman or hopeful homeowner.

Land loans are not inherently self-liquidating like most others. Cash flow is seldom adequate to cover interest on a full loan, let alone principal. The buyer must find the excess elsewhere. A poor credit rating raises the interest rate and redoubles the difficulties. Even a middling credit rating is not good enough to open entry to most businesses, and a weak one excludes a large minority from homeownership.

Few people can invest heavily in an asset of high price and deferred yields. Those who can have a field with fewer competitors than most, and tend to expand widely. As Loyd Fisher, a homespun Nebraska land economist, explained 25 years ago "When a old rancher sells land it ain't the quarters spreadin' out, it's the sections buyin' the quarters."

Just why "the sections" should want to expand so much gets beyond rationality. Landholding, requiring a minimum of management per dollar invested (relative to fast-turning capital) is the natural outlet for pure unlimited acquisition for its own sake, acquisition beyond the assets one needs to complement his own workmanship. Perhaps it would take a Thorstein Veblen to set this in perspective.

Fortunately for us, Veblen did. He never turned his caustic irony to better account than in his last book, Absentee Ownership, describing the American farmer-cum-land-speculator:

> "Subtraction is the aim of this pioneer cupidity, not production; ... being in no way related quantitatively to a person's workmanlike powers or to his tangible performance, it has no 'saturation point'.
>
> "Their passion for acquisition has driven them ... ; their slavery has been not to an imperative bent of workmanship and human service, but to an indefinitely extensible cupidity ...(which) is one of those 'higher wants of man' which the economists have found to be 'indefinitely extensible', and like other spiritual needs it is self-authenticating, its own voucher.
>
> "The Latin phrase is auri sacra fames (fanatical* lust for gold), ... They (the Romans) had reached a

realization of the essentially sacramental virtue of this indefinitely extensible need of more; ... The object of this 'higher want of man' is no longer (gold), but ... title to a run of free income; and it can accordingly have no 'saturation point', even in fancy, inasmuch as (titles are) also indefinitely extensible and stand in no quantitative relation to tangible fact. ... "They have always, ... wanted something more than their ... share of the soil; not because they were driven by a felt need of doing more than their fair share of work ..., but with a view to ...getting a little something for nothing in allowing their holdings to be turned to account, ..." T. Veblen, Absentee Ownership, 1923, pp. 138-40.

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*[Note: the Latin sacra means either accursed or holy, the emphasis depending presumably on whether described by a critical observer or one possessed. "Fanatical" seems to capture the double-edged meaning being relished by Veblen. It should give pause to many modern economists with their weakness for treating self-interest as The Holy Spirit.] More prosaically, because the carrying cost of land is interest, and because there is a structure of interest rates based on borrowers' credit ratings, those of poor ratings are peculiarly handicapped in the market for land titles. A major factor giving one a good credit rating is the prior ownership of land. Thus, those already holding title to land have access to more land at a lower carrying cost than those trying to enter the market from poverty. The result is a tendency for land to agglomerate in the hands of the financially strong. This immediately introduces a political factor into allocation, because the original distribution of land is everywhere political. Titles go back to a granting sovereign, someone with a monopoly of power. It must be so, because land is not produced, it is always at some point seized and appropriated by force or political guile. Thus through land titles ancient history dominates modern times. But also consider that much land is being politically allocated every day. The radio spectrum is one familiar example; the power drop at Hoover Dam is another. Because of the difference in carrying cost the financially strong add land to their holdings to a lower margin of productivity than prevails on holdings of the financially weak, whether we measure productivity in cash flow or service flow. This is a factor independent of and in addition to the fact that the financially strong likely place a higher current value on service flows (i.e. the amenities of land) of given objective quality. It is often reinforced in practise, too, by the greater political power that accompanies financial strength. The combination of factors may lead the land market far away from anything approaching an efficient equimarginal allocation of land among competing firms and households, to such a degree that traditional micro theory loses much of its explanatory power and the market becomes a travesty

of the Platonic ideal in the textbook. The underdeveloped tool of land and production economics that would tell the tale best is the "marginal net product" of land, as found in Robinson's Economics of Imperfect Competition; Alonso's Location Theory; and Gaffney on "Land and Rent in Welfare Economics" (in Marion Clawson [ed.], Land Economics Research, 1960). This tool makes it clear that two land users who impute the same rent to comparable lands are out of equilibrium if one falls below max due to high intensity, and the other falls below due to low intensity. The tool is not rehearsed here, however -- merely noted.

More serious market failure is the total exclusion of some people from landholding. The "cheap" land of Moreno Valley is very dear by absolute and historical standards, especially in relation to its natural disadvantages. It is only cheap enough to let a ticky-tacky tract house sell for $75k or so, above the reach of about half of all homeseekers. Leasing is the next step down. Long leases are better than short, but some can only rent on short terms. Some renters can't lease at all, and stay in motels. Some go to skid row.

Some, finally, trespass. The homeless sleep in parks; the Sta. Ana River bottom; under freeways; on sidewalks; in libraries; over heating grates; in the subway; etc. Homelessness, hunger and unemployment are all widespread in the U.S.A. while empty lands are "ripening" into higher uses.

Is this the best a free market can offer? A proper "supply-side" economics (which we never had) would increase the supply of available land to accommodate legitimate human needs. If it were just unemployment one could say "too little demand"; if it were just hunger and homelessness one could say "the bums should work for it". But the coexistence of idle hands and hungry mouths points to some barrier to the supply of work meeting demand for the products of work, and an obvious barrier is the artificial shortage of land caused by holdout.

4. The opportunity cost of land is importunate and takes priority

To consume most goods and services is to use them up. Land is not used up. To consume it is to preempt its service flow without impairing its substance. To consume land is to occupy it for a time-slot, which may be as brief as beating a red light or (rarely) as long as the pyramids last (the other six Wonders of the Ancient World have all disappeared without a trace). After us life goes on, on the land once left to us which we then leave to others. "Time-sharing" was not invented by the vacation condo industry but is inherent in the nature of land and life.

One need not actually enjoy or occupy land to consume it. The essence of consuming land is preempting the time-slot from others. Thus holding land without using it, or using it below capacity, is a form of wasteful consumption.

Land income is a prior claim to the joint product of combined resources. As noted to consume land economically is merely to preempt a time-slot from others, regardless of what one does with it. The unreaped harvests of idle land flow down the river and out the gates of time like water wasting through a desert. Lost water may sometimes be useful downstream; lost time never returns. To keep others from using a time-slot is to consume it.

The value of preemption is the highest and best use that might have been made of the land preempted. That is the economic cost. The land is not responsible if the manager fails to realize its value at optimal capacity. Neither are the persons who are excluded. Only the preemptor is responsible, as a manager. This person is the residual imputee who deserves credit for performing above par and blame for falling below.

A great deal of land in fact is not allocated to its highest and best use. The shortfall of realized ground rent below potential ground rent is properly a debit to the manager's account, not the land's; and the party responsible for the manager is the holder of title.

Most economic theorizing has failed to bring out this point. The tendency is to treat ground rent as a residual, a waste basket for all the errors and dereliction of responsible economic actors. This has resulted in greatly understating the value of land relative to other factors of production. Institutional and social factors, too, often obscure the opportunity cost of land.

This is a case where theorizing lags behind practise. In dividing value between land and a building affixed to it the standard practise of appraisers, and speculative buyers too, is the "building-residual method". The land is appraised as though vacant; the building gets the remaining value, if any. The building, once attached to a specific site, loses the mobility of place and form that fluid capital possesses and has no opportunity cost but scrap value, often negative. Land, always lacking mobility of place, retains mobility of reuse because of its versatility, permanence, and irreproduceable location.

5. The private cost of holding land (carrying cost) is not usually the social opportunity cost

The carrying cost (CC) of a land title is interest on its value, Li, where i is the relevant interest rate. (Property

taxes are omitted for now.) In a rising market, in the simplest model,

$$L = a/(i-g) \qquad (1)$$

where a is current annual cash flow, and g is annual increase in a, expressed as a fraction. This is a very useful model; we will see that it remains approximately true even when land yields returns from a series of long-lived structures.

Carrying cost (CC) is interest on land value (L), and it is greater than current cash flow or service flow (a):

$$CC = Li = ai/(i-g) > a \qquad (2)$$

With a little juggling (which I leave to you) we can rearrange (2) to show that CC are just offset by the sum of a and Lg:

$$CC = Li = a + Lg \qquad (3)$$

Lg can be shown to equal dL, the annual increase of L (again left to you), resulting in:

$$CC = a + dL \qquad (4)$$

If we could assume that all market agents can borrow at one common interest rate, and again lend at the same rate, free of intermediation costs, with equal credit ratings and loan limits, and so on, then Equations (1)-(4) might be consistent with an efficient land market. But of course no such thing is remotely true.

Neither can we assume that expectations are held in common. The problem is that both i and g are internal to firms and individuals. i, as noted, varies widely among borrowers, and for ineligible nonborrowers ranges much higher internally. Even for eligible borrowers with "standard" market loans available, they must forecast future interest rates, a subjective matter.

As for g, it is highly subjective. The value of durable capital is based on expected future cash flow, and so is that of land, but there are three big differences at least. The future of most capital is short; that of land is infinite. The future of most capital is limited to the specialized use for which it was built; that of land is varied and unpredictable. The future cash flow of capital is limited by potential competition from new capital with a known cost of production; that from land is limited only by future demand and is likely to rise.

Thus there is little in objective reality to limit expectations. Many buyers have little understanding of valuation

theory. Loan officers should be better trained, but the recent history of U.S. banking suggests otherwise. Without understanding there is little basis for pricing other than the behavior of other buyers and sellers. "A nerd follows the herd". But then valuation is purely circular and loses its anchor in reality. The history of land values, accordingly, is one of manic-depressive mob psychology with swings of high amplitude.

As to allocation of land it gravitates not just to the financially strong but to the psychologically susceptible, that is those most prone to overestimate future incomes, for whatever reason.

6. Land market as a tie-in sale

Pursuing Section 5, the land market is inefficient because of indivisibility. A fee simple title bundles together several things which are hard to dissever. We do not here consider them all, and the various ways that they are sometimes unbundled. We focus on the time-dimension of land. A fee simple title combines two different things: 1) the possessory interest, yielding income for a few years, n; 2) possession from n to eternity.

The indivisibility is largely institutional. Land use itself may be divided into short time-slots, such as beating a red light, landing an airplane, or parking. Economies of longevity (like economies of scale) are inherent in capital like buildings affixed to land, not land as such.

Much land has been and is being used under possessory titles, and leases, limited in time. Standard practise, however, is to sell title in fee simple, i.e. in perpetuity.

The result is that bidding for land titles is always influenced, and often dominated by bidding for the future value, rather than current possessory interest. And therefore the rival who might put land to its highest and best use today is outdone by others bidding for the future value.

7. Limited number of bidders

If there were always large numbers of bidders for land, Section 6 wouldn't matter so much. Among those bidding highest for the future value there would also be many who match any rival for the possessory interest. But land markets are often narrow (for reasons to be given). Thus in auctions there is often "money left on the table" because the second highest bidder was so far below the highest. There is often "winner's curse" where the highest bidder overshoots good sense by a wide margin. These familiar phenomena are evidence of narrow markets.

8. The simple "land value multiplier".

The relationship of future value to possessory value may be introduced by the land value multiplier. Postulate a string of identical land uses in perpetuity, each one occupying a time-slot of n years, and having a present value, G, at the time of investment. Convert G to a level annuity over n years by multiplying times the instalment plan factor; capitalize said annuity in perpetuity by dividing by the interest rate. Now we have:

$$L = G/(1-I^{-n}) \qquad (5)$$

where L is land value in perpetuity; and I = 1+i, (a notation adopted to make it easier for me to write and you to read).

The ratio L/G, which is the reciprocal of $(1-I^{-n})$, is the land value multiplier. Table 1 gives some typical values. Note, these are minimal values based on assuming that G never rises over the years.

9. Determining optimal life

Figure 1 shows the elements of (5) graphically, and makes it clear how they are used to determine optimal life (n) of the time-slots. We have here a typical optimizing solution. The numerator of (5) grows indefinitely with time -- i.e. old buildings would stand a long time if there were no land under them to be salvaged. But the denominator is also an increasing function of n, so its reciprocal, the land value multiplier, falls off to the right as G rises. The product of the two, which is L, thus reaches a maximum, which is optimal life.

Every maximizing solution may also be expressed as a marginalist solution, by setting the derivative of the maximand equal to zero. Doing so, we find that this solution says that the cash flow of the standing defender, assumed to be falling, becomes equal to the opportunity cost of the land, which is found by annualizing the present value of the challenger. Details are not pursued here, but may be found in Friedrich and Vera Lutz, Theory of Investment of the Firm, at p. 110 and elsewhere; in Mason Gaffney, Concepts of Financial Maturity of Timber and Other Assets; and elsewhere.

The Lutz's treatment is especially relevant here because they apply it to the case of obsolescence, that is where each succeeding G is superior to its predecessor. And that is exactly the case we pursue here. However, for brevity I will stick with a maximizing approach, and numerical examples.

This is the case of land "ripening" into a higher use; the case where many persons, following R.T. Ely from 1920, have sought to rationalize land withholding on grounds that use now would interfere with higher use later on.

Lutz's approach immediately reverses that finding. It says that the expectation of higher future uses increases the current value of land, which in turn advances the optimal date of use. Lutz's approach is also challenging in that it immediately implies that higher interest rates act to defer change of use -- the reverse of the usual assumption.

But let us not proceed without specifics. I have a model and some numbers.

A. Simplest model: obsolescence with level cash flow.

"Obsolescence" I use as Lutz did, as shorthand for locational obsolescence caused by rising potential rent from a successor building. In (6), below, cash flow remains constant within each generation (G) of use; but each succeeding generation yields more than its predecessor, along a step function. The later one builds each new improvement the more cash flow it yields -- the "ripening" assumption. Each one is higher than its predecessor by (1+g) , where "g" is a fraction, representing the annual increase in available cash flow to any new building installed. "n" is life of building.

Inspection of (6) suggests (what is true) that L is a decreasing function of n (because the denominator grows from a smaller base). Formal proof is in Appendix I. Now (6) is an incomplete model because there are no capital costs, and no economies of longevity to make optimal life longer than zero. Its purpose is merely to show the force of the one element, g, that is normally alleged to argue for longer lives and deferred beginnings. The normal allegation is backwards. The force of g, taken by itself, is towards shorter time-slots, earlier conversion to the higher use.

Table 2 gives some numbers from (6), for different values of n and i. Four findings stand out.

1. L is a decreasing function of n. "g" argues for shorter life and earlier conversion to higher uses, the reverse of what is usually assumed.

2. The higher is the interest rate, the weaker is the force of g pushing towards lower n (shorter life).

3. For n = 1, (6) collapses into (1), L=1/(i-g)

4. For n>1, L becomes only slightly less sensitive to i. L=1/(i-g) is a good approximation; the basics are not much changed by going to periodic renewal periods longer than one year.

5. The closer g is to i, the more sensitive L is to n.

B. More complete model, with capital outlay followed by dwindling cash flow.

(7) is a more complete equation. It postulates a capital investment, K, followed by level cash flow for x years, which then dwindles off at a fraction d per year until replacement in year n. Derivation follows the lines for (6), and is not performed here.

The ratio K/a is used, rather than K, indicating the cash flow begins at a. (Alternatively we could omit the a and say the cash flow begins at 1.)

Table 3 presents some numerical results from (7), obtained mechanically. Different values of g are entered as parameters, and L is maximized w.r.t. n.

Column 6 shows the g values; column 7 shows the max L values; and column 8 shows the values of n that max L. These n values are then optimal lives. To enrich the table, columns 2-5 show other parameters, letting them vary, too. Column 1 labels each combination with a Key reference, to help identify them in the later discussion.

One may draw a number of generalizations from Table 3. These are subject to two cautionary reservations. One, any generalization drawn from specific numerical examples is subject to refutation by other numerical examples. Two, our program tests only integer values of n, and we are assuming that

interpolation would confirm the pattern shown. Nothing about the equation or the findings, however, would suggest any irregularity, so we are quite confident of these generalizations. We have simply taken "sample cores" from a matrix of fairly predictable qualities.

A]. Our major emphasis here is that optimal n is a decreasing function of g. The expectation of locational obsolescence of improvements does not justify holding land back for further "ripening", but the reverse.

This finding was predicted by Equation (6) and Table 2, but here we have a more complete and balanced model.

Optimal n is also a decreasing function of d and x; and an increasing function of K/a and of i.

Each of these numerical findings makes sense in its own terms. But one common concept unifies and explains all. Whatever raises the rent of the later (challenging) generation, and/or lowers the quasi-rent of the extant (defending) generation acts to advance conversion to the new use, and shorten n.

B]. Optimal n is not very sensitive to g when g --> i; but as n becomes less sensitive to g, L grows moreso. It is the reverse when g falls low enough to make L --> 0. Then L is little sensitive to g, but n extremely so. When L<0, n is indefinitely high.

C]. It is significant that optimal n is an increasing function of i: significant because it is counter to the training and expectation of many economists. Economists are conditioned to apply a Wicksell wine-aging model to any ripening case, and many have. In that model, higher i causes earlier conversion.

In the present model, higher i retards land-use conversion by lowering the rent from the later generation uses, thus lowering the annual cost of holding land in its extant use.

Wicksell himself never did apply his model to ripening land. It is not that Wicksell ignored land. On the contrary, he is notable among capital theorists for the separate treatment he always gives to land. No doubt he saw that the simple wine-aging model does not fit the case.

D]. Optimal n is a surprisingly low figure in most of the sets: surprisingly because the cost and cash-flow relations are in line with common experience, but the n-values are not. To bring n up to familiar levels I had to reduce d to zero (sets A-5, B-5 and C-5); or reduce L to zero or below (sets C-2 and C-4); or make g negative.

The implication is that in an efficient market, and with land value well above zero, as today, sites would be renewed much earlier than the pace we are used to today.

In A-6 I let defender cash flow actually rise (by making d=-.03). Even this fails to raise n much. The one exception is where g<.04. But low values of g in tandem with negative values of d are a most unlikely combination. The same rising neighborhood demand factors that would make d negative would also make g high.

It is common of course for rising neighborhood demand to raise defender cash flows at the same time it raises challenger net rents. The examples in A-6 suggest, however, that the higher defender cash flow will not by itself account for much deferral of replacement.

The reason is that the same pattern of cash flows experience by the defender is, in this model, anticipated for all future challengers, thus raising the opportunity cost of land. One could of course alter the model to make the rising cash flow peculiar only to the extant defender, leading to greater sensitivity of n to d. It would be a useful extension of the work. We have not done so here, however.

E]. Optimal n is moderately sensitive to i; and moderately senstive to K/a. Predictably, then, it is more sensitive to the two factors in tandem, and yet moreso to three. Thus, for g=0, compare sets A-1, B-1, B-2, and B-3. n begins at 10. Raising K/a to 5 raises n to 15. Raising i to .10 kicks n up to 19. Dropping d to .05 kicks n up to 31.

But dropping x from 7 to 3 (B-4) has little added effect on n.

F]. Optimal n is generally only moderately sensitive to all parameters except in a narrow range as they approach their limits, when n abruptly explodes toward infinity. This is also the same range where L becomes zero or less.

Thus, any positive rent is enough to force conversion in some finite period, a period much shorter than what we customarily assume to be the physical life of buildings. Only the absence of land rent accounts for indefinite waiting for land to ripen into a higher use.

10. Ripening and the inefficiency of land markets.

The market for land titles, fee simple titles, is the relevant market as to building, transferring land between uses, and changing parcel sizes and shapes. The market for land

services is slow, but that for land titles is viscous. There is no flow of supply, none at all. The market merely transfers existing titles. (There is a supplemental market in long leases, not addressed here.)

The aggregate stock changes hands slowly, with one or two percent turnover of ownership annually (measuring the stock by value, not number of parcels -- smaller, cheaper parcels turn faster). But buyers often need adjacent land, or land in particular districts or with particular qualities, and find little or no land on the market, or land controlled by one seller.

A common precaution is buying excess land for possible future expansion. This behavior is one of those things that necessitates and justifies itself, considered in the aggregate: it is self-aggravating and self-authenticating. When everyone buys and holds for his own future expansion, everyone has to: the market in raw land is turned to glue and ceases to serve the median person in time of need. It is a species of vertical integration and, like all vertical integration, it destroys the free market in raw materials and vastly inflates the aggregate need for holding raw materials because there is no pooling effect such as the market provides inherently.

In certain margins of supersession (change of land use) the technical need is to assemble small parcels into larger ones, as where commerce, industry and high rise are moving into a district of single homes on small lots. This condition maximizes market failure. It normally takes years to assemble an optimal parcel: one holdout can spoil years of negotiating and financing. Straw buyers and front men are used to keep principals and their intentions secret. Speculators are everywhere, trying to assemble large plots or hold up other buyers. Whole districts are held by anonymous absentees; buildings deteriorate, neighborhoods lose their natural leaders and stabilizers, and communities disintegrate leaving slums and blight, crime and arson, public charges and vandalism.

Withholding is also rationalized as waiting for greater certainty. This involves a fairly transparent fallacy of composition. The waiting landholder imposes uncertainty on others who are waiting to see what he will do. Waiting landholders collectively also impose costs on the public which has at the very least a prior investment in national appropriation and defense of the land, and usually heavy investments in public infrastructure which await private response. It is a situation where the gains of waiting accrue to the private landholder but the costs accrue to others, a clear condition for market failure.

The sum of those factors makes for an inefficient market in land titles. Everyone who can tries to acquire land for his own future expansion. Timely subdivision may be foregone in anticipation of future assembly problems, skipping an entire generation of optimal land use. Neighbors adjusting lot lines have only each other to deal with. Aggregate landownership is highly concentrated because of the small numbers who can invest for deferred yields; the number of sellers in one district or for one use is more narrowly limited because of spatial immobility and low turnover and impossibility of new land creation. Financing is especially difficult because the asset is not self-liquidating. Many holders are waiting for the rise, and/or for greater certainty to be provided by others who in turn are waiting for them.

"Credit Rationing and the Land Market"
M. Goffney, "Land Reform through Tax Reform," 1992

APPENDICES

T = tax levy
t = property tax rate
V = market value of land, and base of property tax
i = interest rate, real (= nominal rate less inflation rate)
R = gross revenue from land
e = expenses (current)
a = R-e = "cash flow" from land
V/a = the price/earnings ratio of land

I. How property tax rate is capitalized into lower land price

$$V = \frac{a-tV}{i}$$

$$V(i+t) = a$$

$$V = \frac{a}{i+t} \qquad (1)$$

At t=0, parties with access to cheap money (low i-values) have a differential advantage in bidding for land. The price/earnings ratio is V/a. V/a=1/i. A low i-value translates into a high ability to bid for land of given yield (a). As t rises, however, t swamps out i. V/a --> 1/t, the same for all parties.

Thus, a highly discriminatory market (the credit market) is by-passed, and replaced by a non-discriminatory market.

II. How tax cost of holding land displaces interest cost

$$V = \frac{a}{i+t} \qquad (1)$$

$$T = tV = a\,\frac{t}{i+t} \qquad (2)$$

$$iV = a\,\frac{i}{i+t} \qquad (3)$$

In (2), as t rises, T --> a. At the same time, in (3), iV --> 0, and becomes a minor element in holding costs. Thus, a high t swamps out the effects of credit discrimination.