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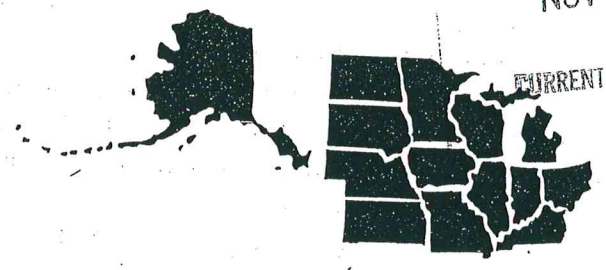
Rent Theory, Problems and Practices



Agricultural Experiment Stations of Alaska, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin, Cooperating.

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GROUND RENT AND THE ALLOCATION OF LAND AMONG FIRMS

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Introduction

This paper deals with ground rent, not contract rent. There are several reasons for singling out ground rent and treating it separately. It is ground rent, not contract rent, that determines the allocation of land among firms. It is ground rent that determines the optimal allocation of land between present and future uses, that is to say that determines the optimal timing of demolition and renewal. It is ground rent which perdures, and extends in anticipation into the remote future, and is capitalized into land values so high relative to current income as to pose the financing problem which is the main root of tenancy. It is ground rent which provides the main rationale for public outlays on projects that open up new lands, and so guides the allocation of developmental resources.

Some problems in defining and imputing ground rent

In basic conception, ground rent is a straightforward and uncomplicated idea: it is the net product of the ground, that is the gross product less the private costs of making the ground productive. It was a concept that commended itself to our simple classic forebears and might lay some claim to having been the foundation of classical economics.

Yet as we all have learned to our sorrow, in its application the concept poses several perplexities which have even led some economists to throw up their hands and abandon it, at least as a practical tool.

Likewise some economists have given up the idea of imputing products to labor, or other specific inputs. Yet if we cannot impute returns to specific inputs we have lost a good deal of the value of economic analysis—for much of our policy recommendation is based on attributing outputs to specific inputs. So I believe it is worth making the effort to clarify the concept and keep it in working order.

Ground rent as an income

Ground rent is basically an income, received in return for a flow of services from a resource that is not depleted by use. It does not include payment in return for depletion of virgin fertility, as some of that is not an income but a transfer payment. Of course ground rent is also net of depreciation and turnover of artificial fertility, and of all other inventories and improvements.

Ground rent vs. the income of improvements

Several economists have registered difficulties in distinguishing ground rent

from income imputable to improvements. I believe it is possible to resolve most of these problems and will suggest what seem to me workable solutions to several which come up frequently, proceeding in order of increasing sophistication.

Improvements physically mixed with soil

The distinction of an improvement from the ground is not dependent on the improvement's being aboveground. Underground tiles are economically quite comparable to fences or barns: they are products of human effort; they increase output; they require maintenance; and they depreciate. Easy visibility is helpful in appraising, but not otherwise very relevant to economic analysis.

The same is true of soil amendments, except that these are more analogous to inventories of raw materials which remain about constant in quantity while the individual components turn over.

"Permanent" improvements

Some improvements depreciate so slowly that for practical purposes they may be regarded as permanent. Examples are filling in shallow underwater sites- "making" land-for urban use; or cutting a natural dike to drain a swamp. But the fact that the improvement and the site are now inseparable for a very long time does not prevent the economist from distinguishing the natural from the human contribution.

The human contribution can be no more than the cost of the operation, and later the cost of duplicating it. It can be less, if the costs exceeded the benefits, and/or if they exceeded available alternative costs, or if the raw site, if available today, could be developed in a better way by some new method or for some higher use. The rest of their combined values imputes to the site, and would in fact be its market value if it were still unimproved.

Confusion may arise because the unimproved site would yield no income, which leads the unwary to conclude it has no value. Man's propensity is to understate his debt to Nature, and overestimate his own contribution. It is surprising how often one meets the argument, even from economists who should by training be sensitive to its irrelevance, that "land produces nothing until combined with other inputs". No input produces anything until combined with other inputs. But the point is often clarified when one seeks to buy a raw "unproductive" site and learns the price.

Influence of offsite improvements and activity

Physically, the thing we call the "ground" is distinguished from other things in that it is Nature's contribution as opposed to man's. Economically, however, man contributes to its value. External economies spill over from improvements and activities on neighboring sites, both private and public. The clearest contribution is from developmental public works. Markets, affected by worldwide forces of supply and demand, also affect value.

These external human contributions differ from natural ones in certainty of permanence. Roads may deteriorate, for example, and with them the land values

to which they contribute. However, this deterioration is by no means as certain as that of improvements on private land, for in general there is a presumption that the right of way dedicated to the public will be continuously maintained by the public. In a progressive society, continual improvement of transport and utility services are the rule.

So long as we can distinguish the contributions of the atomistic site-holder from those of society it is possible to distinguish the value and income of the ground from those of the individual. Only where the line between the individual and society becomes blurred, as sometimes it does, is the line blurred between ground rent and other distributive shares. An example would be when a private utility, protected with a public franchise, develops a utility network to improve its own lands. In such instances, it is necessary to fall back on *ad hoc* analysis of the terms of each situation in order to make meaningful distinctions. It becomes essentially a problem in determining which developmental functions fall on the private landholder, and which on the public. Those which fall on the individual landholder should not be regarded as enhancing land values, but as exploiting latent values which he is in a position to develop. Those which the public supplies are exogenous to the individual and contribute to the value of land as such.

If we take a large overview, even those land values which seem to be created by human design are seen to be rather the exploitation of natural potentialities. If a municipality or county, for example, enhances the value of private parcels within its jurisdiction by supplying improved water service or roads at a cost below the value of the service, it is simply exploiting an opportunity inherent in the territory it monopolizes, just as the parcel holder exploits his position by building a house or planting an orchard.

Local government represents landholders collectively, and is the medium through which they must act to supply their parcels with certain kinds of collective improvements. Failure of local government to supply an optimal level and mix of services represents a failure of landholders to improve the natural opportunities which they control. The true latent potential rent of lands is that which would obtain if local government as well as the individual landholder behaved optimally.

As we proceed up the hierarchy of levels of government the number of imponderables increases, but the same basic principle holds. If we identify the landholder with the local government, then public improvements that raise parcel rents are simply taking advantage of a natural opportunity appurtenant to the land. If we regard government as alien to the landholders, then it is even more obvious that the individual landholder can take no credit for the increased rents due to public effort.

Distinguishing ground rent from the income of old improvements

The "unimproved value of land", as the Australians call it, is the value a site would have without the present improvements. Of course, this does not

mean a value based on use without any improvements. Unimproved value is rather what one would bid in anticipation of improving the land anew; and ground rent is the anticipated net income on which such a bid would be based.

It is not necessary to go back to the cave men, therefore, to find bare land. It is a concept that looks to the future, not the past, for its meaning. In a dynamic society there is continual supersession of yesterday's optimal use by tomorrow's, with consequent obsolescence of improvements and need to rebuild in whole or part. Bare land value thus comes to light with each renewal. And it may be estimated at any time, for appraisal or assessment, by contemplation of the prospective costs and benefits of renewal from the ground up.

We are accustomed to thinking of ground rent as determined residually, although economists now recognize this as simply a convention. In imputation of income between land and old improvements, it is a poor convention. The old improvements usually have no appreciable salvage value, that is to say no opportunity cost. But the land does. Its opportunity cost is its marginal net productivity in its highest future use. It is necessary for old uses to impute that amount to the land to justify their continued tenure.

Land plays a unique role in the demolition and replacement decision because of land's unique attribute of permanence. Ordinarily, almost the only thing of value to be salvaged from an old building is the site beneath it. The sticks and stones are junk, whose opportunity cost is far below their present value in place. Almost the only reason for demolishing an old building is to salvage the site for a higher alternative use.

It is the old improvements, therefore, which must be valued residually. Their historical cost is irrelevant; any depreciation schedule based on it is, too. Their only value is the excess of the joint yield of land and improvements over the opportunity cost of the bare land. When this excess falls to zero the improvements are worthless. Their historical cost may never have been recovered, but that is spilt milk. The full opportunity cost must be imputed to land, as to every resource, to justify keeping it from its highest alternative use.

An interesting corollary is that when land ripens into eligibility for urban use, virgin fertility loses most of its value. Thenceforth, little or no depletion need be charged, although physical depletion will probably accelerate. This will temporarily increase the net ground rent from farm use, and to some extent thereby tend to postpone urbanization.

None of that is to imply that land should never be valued residually. In determining the future value, for example, this is usually the most practical means. It is the future rate of interest that is externally "given". In general, that resource should be valued residually whose opportunity cost is more difficult to define and measure. In respect to land and old improvements, that is the old improvements. It is land whose opportunity cost is easier to define.

The problem of putting a value on land in the infinite series of future uses—what foresters call "soil expectation value"—poses many interesting problems of its own, in mathematics and the treatment of divergent expectations. I will not

get into any detail on this, other than to note that there is a good deal of it, some of which I have tried my hand at elsewhere.[13] If anyone should care to allege that more needs to be done I would have to agree. But I do believe this is the most promising approach to the question.

Insulation of markets and the meaning of "opportunity cost."

The "opportunity cost" of land may be at different levels depending on what problem one is analyzing. There are barriers keeping land from what otherwise would be its highest use. If we accept those barriers as "given" in a particular analysis, then the relevant opportunity cost is the highest use possible within those constraints.

In our capacity as consultants on farm management, we agricultural economists accept many uneconomical constraints, and advise farmers how as individuals to optimize within those constraints. That is perfectly proper—provided we do not let the attitudes engendered in that work come to dominate all our thinking and emasculate us as social scientists. For it is also our function to advise citizens how, in their capacity as voters, they can create social institutions most conducive to economic welfare.

In our capacity as social scientists and consultants to governments we can raise our sights to higher opportunity costs for land that emerge when we consider breaking barriers to optimal allocation of resources. Such a barrier might be, for example, a poorly conceived zoning pattern. An analogous one, to which the later part of this paper is devoted, is unequal access to credit, which often prevents the highest opportunity cost, viewed as an annual ground rent, from finding expression in a commensurately high bid for the land title.

The highest ground rent, after all undesirable market barriers have been breached, is a concept which may be called the "latent" ground rent. Ideally this rent would be charged against all land uses so as to eliminate all marginal extensions of land-holding, in space as well as time, whose marginal product does not cover the cost.

Generally, a goal of social policy should be to see that all land uses meet this test at the margins, both spatial and temporal. But in evaluating the management plans for individuals, within those constraints that must be accepted, land use is rather to be judged on the basis of those opportunity costs that make themselves felt to the individual, which are often somewhat lower. They are by no means, however, always as low as the residually imputed rent in the current use, and when that is so, the deficit must be imputed to the manager as a negative profit. We cannot blame the land for its own mismanagement, for land is passive and unresponsible. The land should be imputed its opportunity cost and the managers get blame or credit, as the case may be, for deficits below or surpluses above that.

[13]"Concepts of Financial Maturity of Timber." A.E. Info. Series No. 62, N.C. State College, 1957 (2nd Impression, 1960).

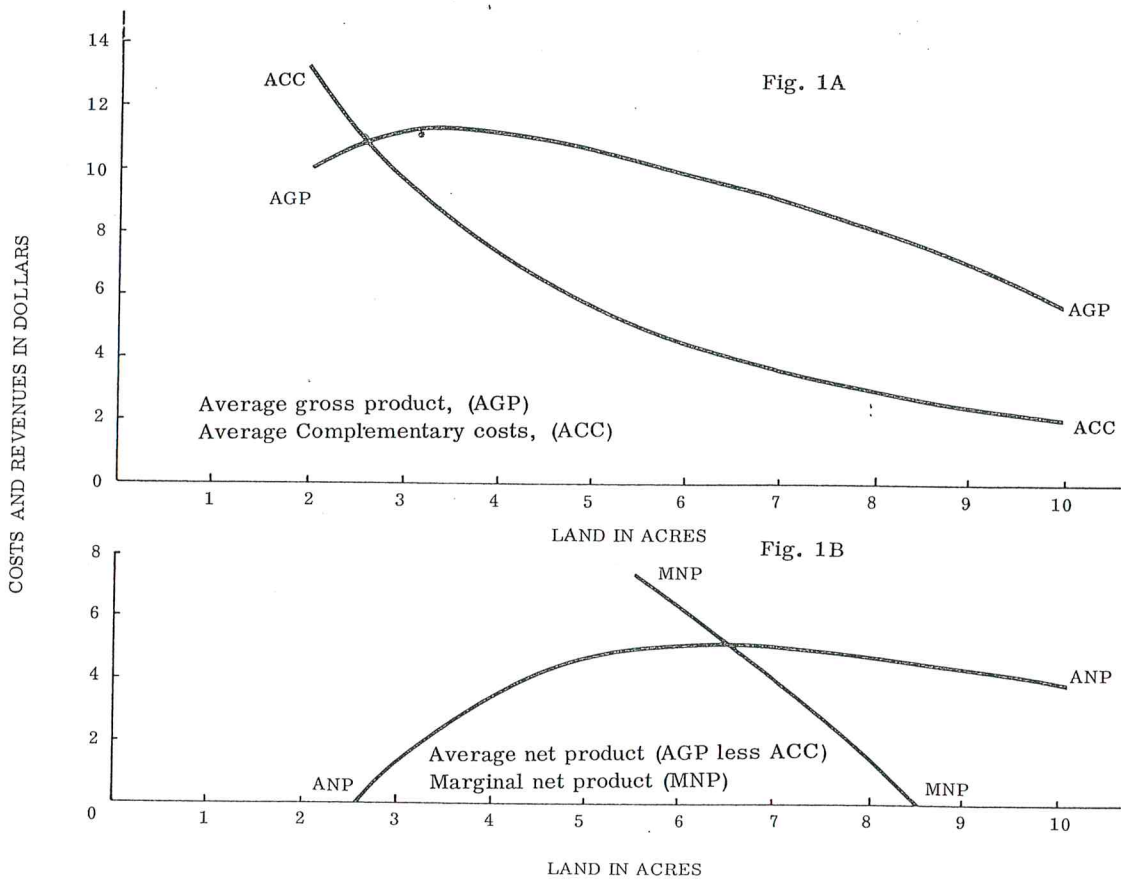
Marginal vs. Average ground rent

If we begin with fixed complements of labor and depreciable capital *(i.e.* other than land), and increase the land input, the average and marginal products of land rise and then fall in a pattern with which we are all familiar, the marginal curve intersecting the average curve at the latter's maximum. We can apply this analytical tool to ground rent by letting the complements increase along with the land, choosing that application of the complements which would be optimal for each acreage considered. Subtracting the average complementary costs from the average gross product leaves us with the average net product of the land, or ground rent. The curve will rise to a maximum and fall, just as does the simple average product curve, only of course with a less steep gradient. The point is illustrated in Figures 1A and 1B.

Average net product (ANP) is the difference between AGP and ACC in Fig. 1A. It is graphed separately on Fig. 1B. Note the characteristic lens-shape. Having the average net product curve, a marginal net product curve may be constructed to it, related just as in the simple case. This is the MNP curve of Figure 1B. It can also be constructed as marginal gross product less marginal complementary costs.

In long run equilibrium, marginal, and average rent would be equal. However, long run equilibrium is a remote will-o-the-wisp that economic forces pursue without often attaining. In particular, in times when the optimal scale of farming has changed rapidly, as over the last twenty years, necessitating a painful regrouping of rural spatial relations, the number of farms of optimal size is few. Divergence of average and marginal rent is the rule.

Added to this, even in periods of static technological optima, inadequate financial resources for land purchase hold many units in the stage of increasing


COSTS AND REVENUES IN DOLLARS
14
12
10
8
6
4
2
0
ACC
AGP
AGP
ACC
Average gross product, (AGP)
Average Complementary costs, (ACC)
1
2
3
4
5
6
7
8
9
10
LAND IN ACRES
Fig. 1A
8
6
4
2
0
MNP
ANP
ANP
MNP
Average net product (AGP less ACC)
Marginal net product (MNP)
1
2
3
4
5
6
7
8
9
10
LAND IN ACRES
Fig. 1B

average returns to land, where they manage to survive by imputing less than the marginal cost to a large bloc of their assets—say the owned plus the first mortgage portion—which they get on better terms than they could additional funds. At the other extreme, are those with superabundant assets, relative to their management capacity, who can and do accept lower marginal rates of return than many others in their neighborhoods. These fortunate persons will not be forced by competition back to an optimal landholding.

In analyzing the allocation of land among firms, it is the marginal rent that is relevant. When the optimal acreage has risen materially, as recently, so that many farms find themselves below that optimal size, the social opportunity cost of land in other holdings is to be reckoned at the marginal rent, which is higher than the average. It is possible for expanding farmers to pay more for marginal acres, either as rent or purchase price, than they could pay for the average acre of their farms. It will pay many less aggressive farmers to partition their holdings among their expansive neighbors at such high prices. This is part of the pulling and hauling involved in the awkward transition from one average acreage to another. But woe be unto that individual, or that people, who mistake these high prices for those which the market can sustain!

Another element of instability in the transition to a larger average farm acreage is the speculative expectation of continued rising land prices that may be engendered by a long period of actual increase. By and large, and notwithstanding many exceptions, it is larger landholders with greater financial strength who are able to put the higher present value on these future expectations. This factor adds strength to another sort of "economy of scale", derived from financial rather than technological conditions. And so a move toward farm enlargement may feed, to an extent, on itself, as expectations of rising land prices stir up speculative demand which fulfills and reinforces the expectation.

In the last twenty years, our profession has directed its cruelest barbs against the farmer who remained too small, although much of his inertia might be rationalized as an effort to recover part of the unexhausted values of old improvements. By contrast we have been gentle with him who remained or became too large. It is also possible, however, to operate too many acres with too little management, labor, buildings and equipment, and move to the right of the optimal point of maximum average rent.

In this event, the marginal net product or marginal rent of land is less than its average value. As Figure 1B indicates, the marginal rent falls to zero, while the average is only a little below its maximum. This means that such farms can dispense with land at small marginal reductions of output. Experience with acreage control programs, where many farmers with little difficulty maintained output after large acreage reductions, suggests that this situation is not so uncommon. The essential diseconomy of holding surplus, underutilized acres is concealed when land prices are rising by a good percentage each year. This "capital-gain", magnified by its partial exemption from income tax, constitutes a sort of

revenue from lands otherwise unproductive and seems to obviate any close economy of the land resource by the affluent. But when two decades of annual price increments have brought land values to a high plateau from which further increments are unlikely, but on which base taxes and interest and depletion[14] begin to burn even the "strongest hands," we move into a time of very different reckonings when fundamental reconsiderations of our ideas about economies of scale are due.

Tenancy and the contrast of marginal rents

Tenancy is an institution whereby those who hold title to surplus land to which they can impute little marginal rent lend it to others with title to too little land to round out an optimal unit. The economic pressure leading to tenancy is the difference between the marginal rents, not the average ones, imputed by those with too much and too little land. The average rents, in fact, might be the same. Average rent might even be higher on the larger holding, (although this is unlikely,) and it still be economical to lease land to a smaller one.

Sub-rents vs. whole unit rents

The ordinary meaning of rent is as applied to a whole economic unit like a 160 acre farm. Within the unit, however, there is an internal spatial organization which puts a higher premium on some space, *e.g.* in and around the farmstead, than on other, *e.g.* the back forty. In his use of land the farmer should, therefore, recognize sub-rents, and economize accordingly. And in buying or selling land to expand or contract his acreage he should price it by how it fits into his scheme of things, not as an entirely homogeneous input. In respect to location, every inch of ground is unique, and in adding land to an enterprise, additional acres are likely to be marginal not just in quantity but in location as well.

Deduction of agent costs

When land is leased, tenant-landlord relations consume a good deal of attention, as Dr. Hurlburt's paper shows. This is expensive, and if the landlord employs an agent will be measurable in a monetary excess of what the tenant pays over what the landlord receives. It is arbitrary whether we define ground rent as what the tenant pays, or the lesser amount that the landlord receives, net of agent costs. In this study, I will follow the latter definition: ground rent is what the landlord receives, net of agent costs. This definition has the advantage that this is the ground rent on which an absentee landlord would base his bid for a land title. It is also the net social value of the land under tenancy, agent cost being dead loss.

[14]At higher land values the proportion of virgin soil which it is economical to deplete has declined as the value of a centimeter of topsoil has risen. More of the virgin fertility has become conservable. Higher unit depletion charges, and higher conservation outlays, mean lower net rents.

DIFFERENTIAL CAPITALIZATION AND THE ALLOCATION OF LAND AMONG OWNER-OPERATORS

This audience requires no demonstration that land ideally should move to the firm prepared to impute it the highest marginal rent (net revenue product). That is the clear implication of basic economic analysis, subject only to special reservations and quibbles that do not challenge the underlying principles of economizing.

Our institutions raise many specific barriers to this goal, items too numerous to detain us here. But one barrier is so universal, so transcendent of specific ages and cultures, as to warrant our attention as a general problem of economic theory. That is the barrier between borrowers and lenders in the markets for money and credit.

Let us suppose, to make the point, that leasing land has been outlawed: operators must be owners, and owners operators. In this world of owner-operators, land would move to the tenure of the highest bidder. But this bidder would not necessarily be he who would impute the land the maximum marginal rent. Capitalization rates are of co-equal weight in determining bids, and these rates vary among individuals.

Individuals differ widely in the relation of the assets they command to their capacity to manage them productively, so there is no tendency for marginal productivities of assets to be equal as among individuals. It is widely assumed in our profession that money and credit markets meliorate this condition, but, at best, our financial institutions leave a wide gap between the high interest rates they ask and the low ones they pay: necessarily so if they are to support themselves, and, often, a good deal more so because they are sheltered from competition.

But that is the best view of it. There is room for debate whether financial institutions on balance tend at all in the direction of equating the financial strength of individuals, inasmuch as the overriding criterion of lending is collateral security. To a high degree, therefore, financial institutions are media *via* which money runs uphill, that is from depositors of moderate means, who need the liquidity that financial institutions can provide them, to borrowers with abundant collateral security. Thus financial power tends to cluster about established nuclei, rather than spread itself about equimarginally.

Land economists are familiar with this phenomenon, and with the various rationalizations of it. Many economists are more sympathetic with those rationalizations than I, and if this paper were to be twice as long, the additional half would deal with these issues. For brevity's sake I am declaring them beyond the scope of this paper, hoping that Section V, which discusses how we may short-circuit the money markets, will obviate the larger part of such a discussion anyway.

"Financial strength" is a concept of several dimensions. For expository brevity we may sum them up in i, the interest rate internal to the firm, and this

paper will follow that practice henceforth. This *i* is a very simple concept, yet in my experience often calls up all manner of irrelevant and even mystic connotations, so let us dwell on it for a moment. It is premised on the idea that each individual and firm is an island, so to speak, in respect to credit, separated from other islands by the costs of transferring funds. On each island there is struck a separate supply-demand balance which determines a separate insular interest rate, *i*. This insular *i* is the joint product of all the factors contributing to the individual's supply and demand, and does not depend on or imply any particular dogma about interest. It is the obvious and immediate result of the simple fact that it costs money to lend money, and these lending costs vary with the borrower.

In order to avoid confusion between this concept and various others, and to signalize the insular analogy, let me christen it the "insular" interest rate of the individual or firm. The insular individual interest rate is the internal rate established by the balance of supply and demand within the partially insulated economy of the individual. Those have low insular interest rates whose owned assets and credit lines are large relative to their ability and inclination to administer these assets; and those have high insular interest rates whose ability and inclination to put money to productive use are high relative to the assets at their disposal.

A low-*i* firm can bid land away from a high-*i* firm if the marginal rent of the land is the same to both. This in itself is not a serious diseconomy, but the low-*i* firm can now expand, and the other must contract, until a final equilibrium in which the marginal rent is materially lower to the low-*i* firm than to the other. At this point the marginal rents of the two firms will bear the same proportion as their interest rates. This is the problem of differential capitalization.

The problem is exacerbated when there prevails a general expectation that rents will rise in the future. Suppose, for a simple example, that rents are expected to rise in a geometric progression of *d*% per year. The capitalization formula becomes

$$V = \frac{a}{i - d} \qquad (1)$$

Subtracting *d* from *i* in the denominator adds leverage to *i*. In the simple capitalization formula *i* is co-equally important with *a;* but here *i* is more important.

Consider a numerical example. If the insular interest rates, *i,* of two firms are 8% and 4%, and constant future rents are expected, the two firms will adjust their marginal landholdings until the marginal rents bear the ratio of 8% to 4%, or two to one. But if they expect future rents to rise at 2% yearly the ratio becomes $\frac{.08 - .02}{.04 - .02} = \frac{.06}{.02}$ or three to one.

Let us put it in terms of marginal cost. Assuming for the present no taxes, the marginal cost of holding title to land for one year equals $V \times i$, where V is land value and i is the firm's insular interest rate. Thus the marginal cost of

holding title for one year varies directly with a firm's *i*. As the firm equates marginal cost with marginal net revenue product (marginal rent), the margins of return to which different firms extend their land-holdings vary directly with *i*, the symbol which epitomizes their financial strength.

Now, within this framework again, let there prevail a general expectation that rents will rise in the future. The increased leverage of *i* may be demonstrated almost as simply as in our first example, and much more generally.

The rising expectations reach back to the present and manifest themselves in two ways, immediately. One is a higher present land value, *V;* the other is an annual increment to land value, *dV,* as the higher expectations of things to come move each year closer to the present. The higher land price, *V,* raises the marginal annual cost of holding title in proportion to the internal interest rate, *i;* while the annual price increment, *dV,* may be regarded as a deduction from marginal cost (or an addition to marginal revenue, as one prefers).

Thus, the anticipation of rising future rents has two effects which are mutually offsetting. The anticipated price increment prompts all firms to expand their landholdings, while the higher land price already realized constrains them all to contract. But the joint forces will nonetheless have an important net effect because their impact is uneven as among different firms. Annual price increments affect all firms similarly.[15] But the impact of higher land prices is proportional to the insular interest rates, *i,* of different firms.

The leverage of *i* is now increased in two ways. First, the base on which interest is reckoned has risen. Second, the annual increment to land value, *dV,* a constant as among different firms, is to be subtracted from the interest cost, thus magnifying the relative effects of given differences in interest cost.

Let us repeat this reasoning in symbolic form. The equation of marginal cost and marginal revenue in the land market requires basically that marginal rent (MR) equal interest cost, *Vi:*

$$MR = Vi \tag{2}$$

But with rising rents expected we must change (2) by subtracting the annual price increment, *dV,* from interest cost.

$$MR = Vi - dV \tag{3}$$

This may be called the "dynamic equilibrium condition" of the market for land titles.

The leverage of *i* is brought out most markedly when we divide through by *V:*

$$\frac{MR}{V} = i - \frac{dV}{V} \tag{3a}$$

The rightmost expression, dV/V, is the annual rise of land value expressed as a percentage. If the figure is say 2%, the constraining force of a 3% insular interest rate, *i,* is cut down to 1%. The force of a 6% insular interest rate is cut down

[15]Under our present assumptions, that is. In practice expectations of increments vary with individuals, posing an additional problem not treated here. It is also probable that credit-weak individuals cannot put much value on increments until shortly before the date of actual cash realization.

relatively less, to 4%. The ratio of the two constraints is cut from .06/.03, or two to one, down to .04/.01, or four to one.

The net result of rising expectations then is an increased leverage for interest differentials, tending towards greater disparities of marginal rents between low-*i* and high-*i* landholdings. Holding land completely idle under new reclamation projects, or in suburban areas, is the extreme manifestation of this. Where price increments are rapid, they alone may be enough to offset the cost of holding title and justify (to the individual at least) holding land whose marginal revenue product is zero.

Is it not plausible that the same force, in milder form, has been working in the farm real estate market in the last twenty years? A recent study alleges that increments to farm land values have constituted half the net income of agriculture in recent years, but regardless of the exact figure, these increments have clearly been a major force to reckon with.

Our profession has neglected to make this reckoning, with the result that our analysis of trends in land tenure gives undue, at times it seems exclusive, emphasis to technological factors. For example, recent analysis of trends in farm size has focussed on the rise of mean acreage per farm, with technological forces receiving almost all the responsibility. Meantime, we have shut our eyes to an equally striking acreage trend, that is the increasing dispersion of farm sizes around the mean, or the drift toward extreme contrasts between large and small farms. This is easiest measured in the Lorenz Concentration Ratio, an expression of the bend in a Lorenz curve. The Lorenz Concentration Ratio for the distribution of farm land among holdings of different sizes has been rising rapidly.

This aspect of recent trends would seem to defy and deny the technological imperative that is usually invoked to exorcise demons of doubt over the welfare implications of farm consolidations. For technological factors alone would tend to force farms toward mean optimal sizes. Instead, however, farms are becoming ever more disparate in size. This trend is more consistent with a thesis based on increased relative importance of the problem of financing title to land that is expensive today and expected to be moreso tomorrow. This is not a thesis that can be demonstrated with experimental data borrowed from the Department of Agricultural Engineering. It is a job for fresh research by land economists, and one which we have neglected overlong.

But, for the present paper, we are primarily concerned with the conclusion that the allocation of land among owner-operators is powerfully influenced by capitalization rates which vary among individuals; and that these individual differences take on magnified importance in a rising market. These conclusions give us some insight into the economic forces leading towards tenancy, which we take up next.

THE FUNCTION OF TENANCY

Short-circuiting the money markets

Tenancy is a means for transferring management control of land from those

with surplus to those with shortage of both land and the financial strength to buy more. It accommodates the weakly financed who prefer to buy durable inputs as they do others, one year at a time, and avoid the financial burden of investing in a costly present claim on remote future values. It substitutes the borrowing of land for the borrowing of money.

Tenancy is thereby a means to meliorate the problem that would obtain in a world of owner-operators, the problem of widely divergent marginal rents of land on large and small holdings: high rents on undersized, overstaffed holdings; and low ones on oversized, relatively undermanned holdings.

The function of tenancy, as often expressed, is to let landlords help tenants by bearing for them the financial burden of holding title. This interpretation strikes a change of nuance that is misleading. It seems to presume that the high price of land is an ineluctable burden imposed by Nature, a "given" with which man has no choice but to cope as best he can.

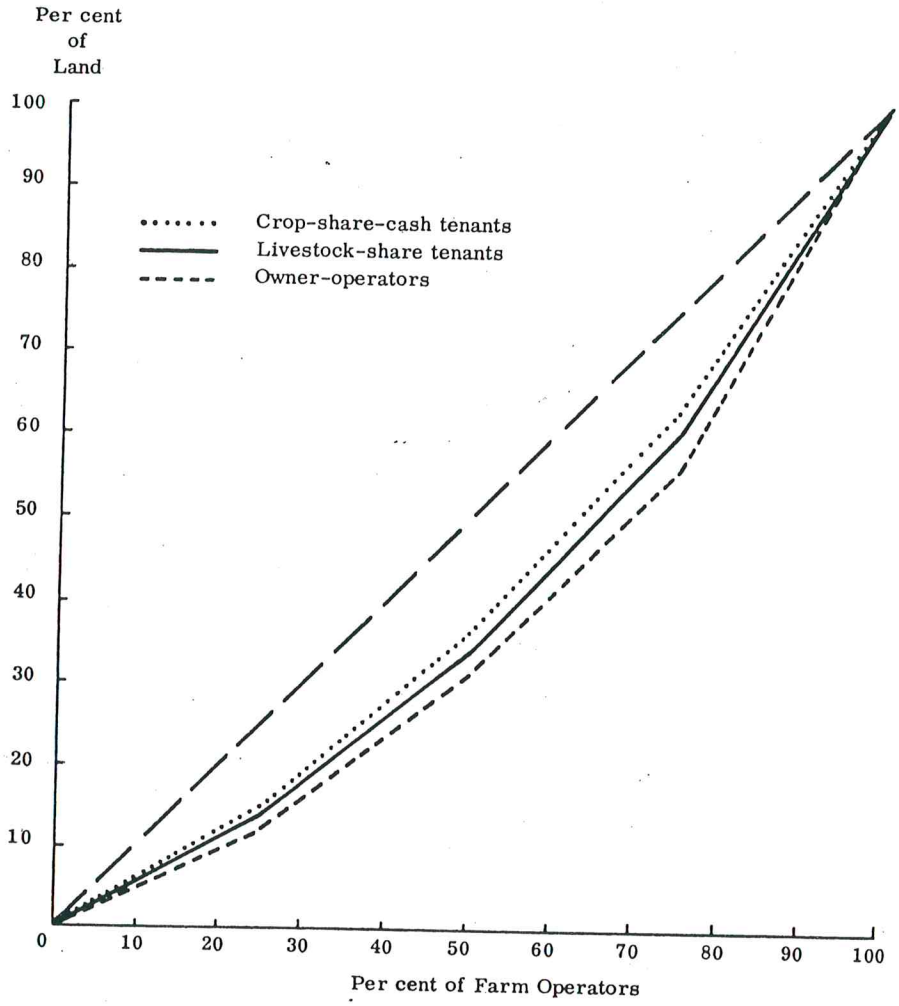
From the small individual viewpoint, it is true, the market level of land prices is fixed externally. But to transpose this viewpoint to a social analysis constitutes a splendid example of the fallacy of composition. Landlords collectively do not supply land. Nature and public works largely monopolize that function. Landlords collectively rather bid up the prices of titles to this land, above the reach of tenants. Thus they collectively create the need that as individuals they fulfill.

Individual usefulness coupled with collective dispensability is the eternal ambivalence, irony and tragedy of the landlord class. We are ill equipped to understand and cope with worldwide land reform movements, likewise the resistance to them, without an appreciation of both sides of this paradox. To attribute tenancy solely to the financial weakness of tenants is to hold, at least implicitly, an unforgivably naive concept of the origin and determination of land values. Tenancy springs as much from the financial strength of landlords as from the weakness of tenants. It is the contrast of the two, not the absolute level of either, which is essential. Any policy recommendation is doomed to frustration that ignores this basic relationship.

Land vs. other durable inputs

Why is leasing so much more common with land than with, for example, tractors? Because land is much more durable, so that its price-earnings ratio is much higher than for tractors—say 20 as compared to three or so. But there is a difference of kind as well as degree, because tractors wear out while the ground is relatively permanent, and often even better than that, appreciating. So tractor prices must be reckoned low enough, normally, that imputable earnings will return both a yield and the initial outlay within the machine's brief life span. The machine is a self-liquidating investment, but land is priced so as never to return the initial outlay, only a yield on it. Amortization of purchase must come from other funds.

For these and related reasons the interest burden of holding title to land is much heavier than the interest burden of financing less durable inputs. The



APPENDIX FIGURE 1-DISTRIBUTION OF LAND ACREAGE WITHIN TENURE GROUPS, MARSHALL SOILS AREAS OF NORTHWEST MISSOURI AND ADJOINING STATES, 1957

an interesting study. We are here concerned, however, solely with the effects on the allocation of land.

Taxes on improvements as a rule add more to the costs of those who use land more intensively, and so tend to dull the edge of the market's allocative incentives. The difference between high and low marginal rents imputed by more and less intensive users of land is diminished by these taxes.

It is not necessary for a specific acre to be improved to suffer from discrimination of this sort. Suppose an acre is sold from a vacant holding to another with an adequate farmstead. The assessor tends to judge farms as units, and so to speak spread the farm buildings over the lands they serve. In due course, the new acre will in theory be assessed at a higher rate on account of having been thus "improved." In practice, this may account in part for the tendency in some jurisdictions toward relative over-assessment of smaller holdings.

Thus, *ad valorem* taxes on real estate improvements add one more to the barriers obstructing an equimarginal allocation of land among firms. The overall effect of general property taxes as levied in most American jurisdictions today is therefore mixed. Taxes on the land component improve allocation; taxes on improvements worsen it. Whether the net effect is positive or negative is not immediately obvious.

There is some reason to believe that the positive effects outweigh the negative, since the highest development of land is generally found in regions that rely heavily on property taxation. Some striking contrasts are to be made between for example the Anglo-Saxon colonial countries and the Spanish; between the Midwest and the Southeast of the United States; between Denmark and England; and between the Irrigation Districts and the land and cattle baronies of our western states. These contrasts suggest that property taxation is not the curse one would gather from the tenor of many references to it, and that the benefits of its land-tax component outweigh the undesirable damages inflicted by the tax on improvements.

SUMMARY AND CONCLUSIONS

It is possible to distinguish ground rent from other distributive shares so long as one approaches the problem with some sympathy, and with patience for detail, which is to say so long as one really wants to. It is necessary for individuals to do so in order to allocate land with precision to its highest uses.

That necessary condition is not sufficient, however, for once ground rent is identified there yet remain other barriers to the conveyance of land titles to the hands of those who would put the lands to their highest uses. The most general such barrier is the insularity of individual interest rates, and the differential capitalization that results.

Leasing of surplus lands is a means whereby individuals can by-pass the money-markets and shift some lands into higher uses, but there are heavy excess burdens in the landlord-tenant relationship that keep leased lands from reaching their highest development. Society may, however, by-pass both the

money market and the leasing market by relying heavily on *ad valorem* land taxes.

DISCUSSION: GROUND RENT AND THE ALLOCATION OF LAND AMONG FIRMS[18]

Laurel D. Loftsgard
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Gaffney's analysis of "ground rent and the allocation of land among firms" is a thought provoking discourse of many related, but seemingly insufficiently developed, premises. Adequate treatment of this subject in its entirety would have been impossible within the time limitation provided. Although Gaffney has touched on many important facets of land allocation, I would have preferred a more exhaustive analysis of one or two of his major headings such as "Some problems in defining and imputing ground rent". Also, it would have been more interesting to me if a closer tieup between theoretical ideas and empirical bases had been made. Gaffney has given a lucid exposition of accepted theoretical ideas but little, if any, attempt was made to expose either the imperfections of rent theory or the difficulties in using this theory to explain the allocation of land among firms. In particular, some recognition of risk and uncertainty would seem necessary.

It appears from the first few pages of Gaffney's paper that valid analyses of ground rent rests on a careful imputation of returns to land. Yet, his definition of ground rent—"gross product less the costs of making the ground productive" —infers that ground rent is a residual return after all other factors have been paid their market costs. Although this contradiction is a bit vague and has been partially qualified, it adds confusion to the conceptual framework developed later on, particularly because of the heavy emphasis on optimal rent being the highest average net product which is computed as a residual return. In other words, just exactly how does one determine the opportunity cost or future marginal productivity of land? Is it a residual value or an imputed value, or does it depend on the particular situation being analyzed? Gaffney infers that it is the latter. However, this implies that one should impute a rent to land if possible, otherwise a residual value will suffice. If land is allocated on the basis of its marginal value productivity, this framework creates much doubt as to its validity because it is doubtful that land is allocated according to our abilities and tools for determining its marginal value product.

[18]Presented at the UCLTC Seminar on Rent Theory and Practice, April 12, 1961.

Throughout the paper, there was a lack of explicitly defining whether the conceptual analyses applied to the individual firm or to society. Although the goals of both must be identical in terms of maximum welfare or a social optimum, the diversity of their goals or conflicts must be reckoned with when explaining or analyzing causes that allocate land. The variety of precepts regarding land is the major difficulty in determining both the allocation of land and land use. Thus, if optimal farm size is represented by highest average net product, how does one include the non-pecuniary benefits that an individual may derive from land? One can hardly discount these benefits as being sufficiently unimportant to not include them. The emphasis which our society has placed on "family farm theory" indicates that the net product from land used for agricultural purposes must contain some intangibles—easily included in a theoretical framework but nearly impossible to handle in an empirical analysis that endeavors to impute a return to land or determine its marginal value product. In fact, one may even advance an argument here that land to society is becoming relatively less important than non-land resources and that the allocation of land is highly dependent on the supply price of non-land factor services. This does not imply that the marginal rent of land is not important. Instead, it suggests that the classical ideologies regarding the economic rent and allocation of land do not sufficiently recognize the degree of complementarity among resource factors. Analysis based on marginal value product of one factor is a necessary but not sufficient condition for explaining economic phenomena. Accordingly, the allocation of land is not explained by determining simply the magnitude of its marginal value product. In fact, its immobile characteristics make the analysis more complex (or, perhaps, less simple) than that for optimally allocating non-land resource factors.

By using a residual return as the average net product of land, Gaffney described and illustrated that long run equilibrium occurs when average net product and marginal net product are equal. Accordingly, optimum farm size can be defined as the acreage which yields the highest average net product to land. Using this analysis, I question his interpretation of acreage control programs as exposing the level of marginal rent. He indicates that because output is nearly maintained after an acreage control program has gone into effect, the marginal rent on this land must have been less than average rent or the optimal rent point. And the reason this is so is because so much land had been operated prior to the program that its marginal value product had been driven below the optimal point. My disagreement with this reasoning is that: 1, product price changes that accompany acreage control programs largely explain why output has been maintained, rather than the notion that farms were too large; 2, very rapid advances in technology coupled with the fact that the lowest production acres have been idle does not allow valid comparisons inferred in the above analysis. That is, all land is not homogeneous in terms of productive ability and technology has not remained unchanged while these measurements of output were made. The problem of farms being too large is of minor significance, at least, as yet.

While I am not prone always to agree with the varying emphases in our profession, I am reluctant to share Gaffney's views that our profession has not reckoned with the trend in dispersion of farm size. He states that the Lorenz concentration ratio for the distribution of farm land holdings of different sizes has been rising. Consequently, he cites a need for corresponding analysis in terms of trends in land tenure. However, this dispersion of farm size may not be a general event throughout the country. For example, a recently completed study by ARS alleged that for the 10 Great Plains states, there was essentially *no* increase in concentration of land ownership for the 13 year period from 1945 to 1958. Although this study concerns only land ownership, it has a definite bearing on dispersion of farm size.

A scholarly treatment of capitalization rates and effects of *ad valorem* taxes has been made in the paper just given. The importance of variations in both has been illustrated quite effectively. I chose to treat these very lightly because there still remains much doubt in my mind regarding the operational significance of interest rates when determining land values and the allocation of land. There is repeated evidence that the textbook example of the capitalization method for determining land values is, at best, only a conceptual guide for explaining forces at work in the land market. Other factors such as aesthetic values, technology, risk and so on are of major significance both for determining land values and allocation of land.

In regard to *ad valorem* taxes, Gaffney points out that the effects of this tax are opposite on land versus improvements. And satisfactory separation of the two for tax purposes would seem quite remote.

This discussion has touched on only a few points in Gaffney's paper. In general, I believe he has brought to our attention may stimulating views on this topic. Although I would have preferred a less esoteric and more operational treatment of the subject matter, Gaffney has done a commendable job of exposing areas of inquiry that should not be treated lightly by the researchers in our field.

EVALUATION AND DISCUSSION OF SEMINAR PAPERS

Don R. Kaldor
Iowa State University

The special problems of concern at this seminar have an important relation to the larger problems of economic imbalance in the farm industry. The capacity of agriculture to adapt its resource structure and organization under conditions of economic progress is closely bound up with the process of evaluating factor

Professor Gaffney's paper focused on the relations between ground rent and the allocation of land among farm firms. In discussing the problem of distinguishing between ground rent and income to improvements, it appears he may have missed one fundamental point—that investment in land improvement changes the productivity of land and makes land without improvement an imperfect substitute for land with improvement. Thus, for purposes of economic calculation they have to be considered different factors of production. With the

income. When these conditions are not met, it is always possible to increase the income of both tenant and landlord by adjusting lease terms.

Likewise, there is nothing in the perfect competition model which implies that the distribution of personal income which it generates will be fair or equitable. The model assumes an initial distribution of resource ownership. However, the conditions for long-run equilibrium can be satisfied with any number of different distributions. In long-run competitive equilibrium, the distribution of personal income is determined by the distribution of resource ownership and factor prices which are equal to marginal value products.

Unquestionably, distributive justice and other goals do influence lease terms. And as a result, the usual requirements for the "ideal" lease may not be satisfied.

same input of other factors, the difference between the marginal value product of the land with improvement and that without improvement measures the contribution of the improvement. This contribution may be greater than, equal to, or less than the cost of the improvement. To say that the human contribution can never be more than its cost seems to imply that the economic system must always be in a state of general equilibrium.

Professor Gaffney presented a number of useful insights into the concept of opportunity cost as applied to land. Unfortunately, few agricultural economists who have expressed opinions on land retirement programs seem to be familiar with the underlying ideas discussed by Professor Gaffney. Land economists have an obligation to acquaint the public with the meaning and implications of the concept of opportunity cost as applied to land.

I agree with the view that some of our farms may be too large to produce output at minimum resource cost. But I disagree with the implication that this problem is as serious as the problem of too many small farms. Experience with control programs could provide some evidence on this point, but I am not aware of any such studies and Professor Gaffney does not refer to any.

Professor Gaffney's analysis of the effects of differential capitalization deserves intensive study—far more than I have had a chance to give it. As I interpret the language of his paper, he says that the ownership of land gravitates toward firms with a low internal rate and away from firms with a high internal rate. By internal rate, he apparently means the marginal return on investment. Given the marginal value product of a tract of land, the firm with the low internal rate will capitalize its value at a higher figure than the firm with the high internal rate. Consequently, the low rate firm will outbid the high rate firm. What is not clear is why firms should always capitalize on the basis of their internal rates.

There must be some point in the expansion of the land base of a given farm where the internal becomes less than the external rate—the rate offered by alternative investments outside the firm. At this point, the external rate becomes the relevant rate in considering further expansion in the context of maximizing total return. Up to this point, expansion should continue in order to bring the internal rate into line with the external rate.

It is undoubtedly true that farms with relatively low internal rates are better financed than farms with relatively high internal rates. But unless the internal rate is higher than the external rate, why should these better financed farms continue to add to their land base? If they were to expand when the internal rate is below the external rate, they would be sacrificing more attractive alternatives. Therefore, they would not be maximizing their total return.

Also, farms with relatively low internal rates would tend to be units in which the resource mix better approximates the least cost combination. Consequently, the marginal value product of land would tend to be lower than on farms with relatively high internal rates. If the capacity to finance additional land were equal, which it is not likely to be, high rate farms could afford to pay more for the land than low rate farms.

It is my suspicion that differential capacity to finance additional land investment is by all odds a more significant factor in explaining changes in the pattern of land ownership than differential rates of capitalization. And I would argue that, even though the correlation between the capacity to finance additional land and the ability to manage assets may not be high, the two are not independent phenomena.

As Professor Gaffney points out, there are many imperfections in the capital market. While I have no axe to grind for the bankers, it must be recognized that not all these imperfections are the result of monopolistic activities on the part of financial institutions. Some are inevitable because of the existence of uncertainty. It can be argued, for example, that the heavy emphasis which banking institutions place on collateral security is in large part a reflection of various kinds of economic uncertainty.

Unquestionably, agricultural economists have slipped up in failing to give adequate attention to the role of capital appreciation in analyzing the land market and the economic position of farm people. While this probably has been a significant factor in explaining the shifting pattern of land ownership and farm size in recent years, it seems to me that technological and factor price developments have been far more important over the longer pull.

GROUND RENT AND THE ALLOCATION OF LAND AMONG FIRMS: A REPLY

M. Mason Gaffney
University of Missouri

I welcome the opportunity to expand on the points raised by Professors Kaldor and Loftsgard. Their comments remind me sharply that barriers in communication are as serious a problem as barriers in the credit markets. Hopefully the communication barrier may be breached by the give-and-take of discussion, reply, and rejoinder. I will begin with Professor Kaldor's comments.

I do not believe it is quite accurate of Professor Kaldor to say that I "missed" the point that "land improvement changes the productivity of land." That is a little bit like saying that one has but to hear the statement to agree with it. My position is rather that land has a latent opportunity cost, based on the best future use, which is independent of the present use and present improvements. I cannot even claim originality for that idea. While often honored in the breach, it is basic to *ad valorem* property taxation in the United States, and may be found in the opinions of many judges denying relief to landowners suing to be taxed on the basis of actual rather than potential use.

There is no question that improving land can increase the gross yields from it. That is a truism which I do not contest. The issue is rather whether economists should conceive of land rent as the residual crumbs which remain to be imputed to the land input under inefficient or overextended management; or the highest rent which could be paid by an alternative efficient or underemployed management. Again, the issue is whether land rent is the small net return real-

ized under an old, obsolete building, or the higher rent that could be paid by the optimal succeeding building.

The residual approach to imputing land rent is deeply rooted in economists' thinking, and will not give way easily. But it is my position that we should let the claims of the land input be more importunate. Under the residual approach we in effect rationalize management which is inefficient with respect to land: whatever is left over after other costs is the rent of the land, and so whatever pittance management imputes to land is enough.

It is perhaps this residual approach that lends plausibility to the idea expressed by Professor Kaldor that "land improvement changes the productivity of land." It is only a short step from that to arrogating the rent of land to the credit of the capital inputs that, under that interpretation, render it productive. It would make as much sense to impute the returns of capital to the land that renders the capital productive, or the labor that renders both productive. Any such approach is contrary to the whole spirit of marginal analysis and imputation.

The future-alternative approach recommended in my paper regards improvements not as changing the productivity of land, but as exploiting productive potentialities latent in the land. To the extent that that is mere quibbling over wording I apologize for it. But beneath the question of wording there is a substantive issue of importance, so that it behooves us to watch our terminology and weed out ambiguities.

Under the future-alternative approach, the imputed rent of land would often be higher than the rent currently imputed as a residual. We are accustomed to think of opportunity costs as being inferior to present returns, but that assumes perfect markets, an assumption conspicuously untrue of credit and land markets. If the full rent were charged against land-prodigal enterprise, it would show net losses. Those losses are properly imputed to the land manager—not to the land—as negative wages-of-management. Full-equity landholders can absorb such losses because their equity gives them a comfortable cushion. Some of them have superfluous funds to finance such waste. The residual approach imputes those wastes and lost opportunities to the land. But the land is blameless. Man is in command, and with authority goes responsibility. The future-alternative approach follows the spirit of Winston Churchill's dictum: The waste of capitalism is not in making profits, but failing to make profits.

Professor Kaldor intimates that I allege that land without improvement is a perfect substitute for land with improvement. That a + b does not equal a is another truism that I will not dispute. What I did say is that it is possible at any time to impute returns to *a*, the land, despite the presence of *b*, an old building on the land, by contemplation of the net productivity of *a* in its best future use. That is indeed in practise the way one does decide when to demolish an old building and renew a site. It is also at all times a way of appraising the site without reference to its present improvements.

I must disagree with Professor Kaldor's statement that "the difference be-

tween the marginal value product of the land with improvement and that without improvement measures the contribution of the improvement." In many circumstances, the marginal value product of good land without any improvement would be zero, yet we do not impute nothing to one input just because another input is limitational. Land is also limitational; so is labor, and probably some subclasses of labor and capital which one might define.

I suspect that Professor Kaldor had in mind something more complex and more defensible behind that statement, but I will not conjecture. Perhaps he will elaborate the thought for us in a rejoinder.

As to the last sentence of Professor Kaldor's paragraph ending at the top of page 72 that is simply a misquotation. My text reads "The human contribution can be no more than the cost of the operation, and later the cost of duplicating it." I do not deny that improvements can appreciate after being built. As a rule I think that technological advances tend progressively to lower duplication costs over time. Certainly that is conspicuously true of all earth-moving operations in recent years, for example. Neither of those implies that the economy is always in general equilibrium.

I agree with Professor Kaldor that internal or, as I have dubbed them, "insular" interest rates are influenced by external rates. I seek in vain through my text for any statement to the contrary. My points were that "financial institutions leave a wide gap between the high interest rates they ask and the low ones they pay," and "money runs uphill, that is from depositors of moderate means . . . to borrowers with abundant collateral security."

I hasten to correct the impression which my language evidently gave Professor Kaldor, that my paper is directed against bankers. Bankers do dabble in restrictive practises, as do many economic groups, and that undoubtedly aggravates the problems of making a free economy work. But my text reads that financial institutions leave a wide gap between depositors' rates and borrowers' rates: "necessarily so if they are to support themselves, and often a good deal moreso because they are sheltered from competition." The writer intended to emphasize the first phrase; the reader's eye caught the second. Thank goodness for discussion and replies to rectify my misleading exposition.

I regard lending costs and collateral security as ineluctable in a credit system that is not to fall victim to every Billie Sol Estes.[19] My proposal is rather to bypass the credit system, deflating land prices by means of heavy *ad valorem* land taxes so that land transfers do not entail heavy financing burdens.

I did note that an incidental benefit of that would be to release for higher uses much of the administrative and legal talent now devoted to negotiating mortgage loans. That might be construed as hostile to bankers, but the assumption of higher alternative uses for their talents is not facetious. Heavy land taxes would make of land a much more commercial article than now. Today, land's relative freedom from taxes, and its permanence, give it an heirloom quality that

[19]The man who gave substance to his factor's slogan: "you go faster and farther with Heller dollars."

discourages commerce; and the high equity of most landholders makes them insensitive to all but gross changes in the optimal use to which lands should be put, and permits of long lags between altered demand stimuli and supply response. With high land taxes, lenders should make up in volume of transfers much of what they lose in value per transfer, with the net social gain of a much more sensitive land market. With land moving more easily to the most productive hands, the volume of building, regrassing, renewing orchards, etc., should increase, thereby providing an additional outlet for lenders. That would be even more emphatically true if we took advantage of the higher land taxes to permit lowering the taxes on houses and other buildings and improvements, thereby unleashing a vast investment potential now abeyant.[20]

Professor Kaldor suspects that "differential capacity to finance additional land investment is by all odds a more significant factor . . . than differential rates of capitalization." I suspect, rather, that those are two different expressions of the same idea. Differential capitalization is simply a tool of abbreviated exposition. As I wrote, " 'Financial strength' is a concept of several dimensions. For expository brevity we may sum them up in *i*, . . ." Generally, too, I think it is preferable to express economic phenomena in ways that recognize a full spectrum of possibilities. Professor Kaldor's phrasing seems to suggest that he visualizes each individual with a ration of credit at a fixed interest rate. That strikes me as being more absolute and inflexible than our credit institutions, ossified though they may be, actually are. One can always borrow more at a higher interest rate, as William (20%) Zeckendorf of Webb and Knapp, and Owen Cheatham of Georgia-Pacific Lumber, so dramatically illustrate in the large, and a million finance company customers illustrate in the small. Thus, the differential-*i* concept not only subsumes the credit rationing concept, but allows for more dimensions of reality.

In his last sentence, it seems to me that Professor Kaldor does nothing but state an opinion, with no gesture toward meeting my argument that technological factors would tend to push farms toward mean sizes, while in fact the movement has been toward extremes, small as well as large.

But the statement that disturbs me most is that "farms with relatively low internal rates would tend to be units in which the resource mix better approximates the least-cost combination." That seems to imply that there is a "least-cost combination" that is somehow independent of the cost of credit. What basis is there for assuming that the factor-mix that appears optimal to those who are relatively free of the interest constraint is socially superior to that of those who have to economize on credit, and hence have little or no land? "Least-cost" here seems to mean least per man, or per machine, without regard to the

[20] If the taxes on a $20,000 structure, (over and above taxes on the vacant lot,) are $500 a year over 40 years, their present value at 5% is $500 $\frac{1-(1.05)^{-40}}{.05}$ = $500 x 17.2 = $8600, or 43% of the initial sales price. That is quite a barrier for the state to raise between builders and buyers, the removal of which would open as large an untapped field of investment outlets as almost any single conceivable act of public policy today.

social cost of land. It is this habit of thought, so deeply rooted that we are scarcely aware of it, against which my paper is largely directed.

Professor Kaldor has imputed to me heresies, where I plead orthodoxy. Turning now to Professor Loftsgard's discussion, he imputes orthodoxy where I plead heresy. Would that the ideas I expounded were indeed already "accepted!" The use of marginal net revenue to land as an allocative norm is, so far as I am aware, quite alien to the spirit of today's received doctrines which emphasize the benefits of spreading the overhead of machine purchases over wide acreages, and emphasize too the declining and negligible importance of the land input in agriculture. It is the absence of such a balanced norm as net rent that lets many economists discuss "efficiency" almost entirely in terms of output per machine or per man, to overlook economy of land almost entirely, and hence to manifest a systematic bias in favor of land-prodigal operations. I will draw the curtain of charity over citations of chapter and verse, but the supply is endless.

As to the "non-pecuniary" benefits that one derives from land, it seems to me that among professional economists it should go without saying that those can be given monetary weights and included in the definition of "revenue." Revenues and costs, as used in my paper, are measured in monetary units, but are not limited to values that actually pass through the marketplace. The amenities of living, which some lands offer in much higher degree than others, are included in revenues. Is it also necessary to spell out that negative amenities are a deduction from revenues, or an addition to costs?

The marginal contribution of acreage to the amenities of family living obviously encounters diminishing returns. Indeed, the point is more evident in respect to such amenities than with respect to physical outputs, for the family that derives its amenities from ten acres pretty obviously gets more marginal benefits from the 11*th* than a much larger farmer does from the 1000*th*. And so the inclusion of amenities does not alter the general drift of the thesis of my paper.

I must confess that the topic sentence of Professor Loftsgard's second paragraph eludes me, and I will not try to comment on any of it but the direct question it contains: "how does one determine the opportunity cost or future marginal productivity of land?" In the text I shunted this question aside by referring to other sources, but, as long as the question comes up, let me summarize them briefly here.

The future opportunity cost of land is determined by converting the net land income anticipated from future plans to a constant annuity, *a,* and of course selecting the plan yielding the highest anuity:

$$a = \frac{i \, \xi \, [R_n(1+i)^{t-n}]}{(1+i)^{t} - 1}$$

where *i* is the relevant insular rate of interest; R_n is the net revenue (sometimes negative, since it includes costs) of year *n;* and *t* is the terminal age of the new improvement.

One may, if he chooses, regard *a* as a sort of residual, the excess of future

annualized revenues over future annualized costs. One may, however, equally well regard *a* as the marginal net revenue of land-time, that is, the increase of net land revenues that would result from lengthening the future use one year toward the present. As in other imputation questions, the marginal net revenue derived directly equals the average net revenue under optimal equilibrium conditions. The marginal and average figures may also differ, for example, when the future use's life-span is compressed by the constraint of some anticipated early future change in the best use of the site, like urbanization. Then, marginal net revenue exceeds average net revenue. Where there is a difference, marginal net revenue is the proper guide to allocation at the margin of decision, so long as the corresponding average net revenue remains high enough so that the use-cycle is viable in its entirety.

It is a mistake, I believe, in general to regard residual imputation and direct imputation as distinct or incompatible procedures. As a rule they lead to equivalent, or at least reconcilable, results, which fact has been duly noted and incorporated into the generally accepted body of economic doctrine. In the concept of "marginal net revenue," indeed, residual and direct imputation are fused together in one package.

Purely residual imputation does have an important role in the theory and practise of distribution, it seems to me, a role which has been obscured by the inadequate attention which economists give to the time element in production.

Residual imputation is necessary when an input is fixed, in the sense that it is irrevocably committed to a use and cannot be withdrawn. Our custom has been to treat land that way, because we instinctively think of land as "fixed," but in the sense that is relevant for distribution theory I believe that is an error. Irreversible commitment, rather than spatial fixity, is the essential quality that calls for residual imputation.

Irreversible commitment of resources to one form or use occurs when we sink resource services into specific human products. When, for example, an investor finances the production of a pair of shoes, the resources so sunk are embodied in that form, undisseverably, in the sense that they cannot be withdrawn for other uses without unacceptable economic loss. Their salvage value is so far beneath their shoe value that for practical purposes they have, once sunk, no opportunity cost.

There is a time-lag between investment, the irreversible commitment, and the disclosure of its outcome through sale. The investor carries the shoes over that period and receives his return as a residual upon liquidation. That return is a residual not as an arbitrary convention, or a theorist's convenience: it corresponds to the facts of life. Over the period of commitment, the investor is without alternatives, without recourse. It is to this kind of truly residual return that the word "profit" is vulgarly applied, and in this case I believe the vulgar usage is a good one for economists to adopt, only being certain to net out all complementary costs more scrupulously than is customary.

The investor's residual profit is net of not only initial cost, but also of all

subsequent costs of storing, transporting, selling, etc. Again, those costs are exogenously fixed. The investor absorbs them and takes his return as a residual, an *ex post* discovery.

With buildings, the subsequent costs generally assume greater relative proportions than with commodities like shoes. Buildings also differ in that liquidation is not the work of an instant, but is a long slow trickle over many years. The net value of each year's trickle is a residual after current operating costs.[21] So much is standard doctrine, or not far from it. The innovation I propose here is that site rent should be regarded as parallel to current operating costs, exogenously fixed by its opportunity cost, which is its annualized value in its highest future use. When the sum of these exogenous current costs exhausts the gross income of the building, the trickle of liquidation has dried up; there is nothing more to liquidate. The building has no value and should be demolished.

The reason that land merits this different treatment is that its commitment to a use is never irreversible. Its past services may be embodied in building values, just as are the past services of construction labor and other inputs. But unlike the other inputs, the site under a building continues to yield current services, year by year, without let or surcease, and these current services, and future services, may be withdrawn from the present improvement through demolition, and the land released to supply its services to another improvement. In that respect, land differs from almost all the other inputs originally committed to the building. They are like the old shoe which, when it ceases to be a shoe, is junk. But second-hand land suffers no discount. In the larger sense, indeed, there is no other kind, man having desecrated the entire planet, lo these millenia.

Professor Loftsgard continues by suggesting that the "rent" concept does "not sufficiently recognize the degree of complementarity among resource factors." He is dead wrong. Rent is the excess of gross yields over *complementary* costs. It seems to me that Professor Loftsgard here misses the primary purpose of the "net revenue" concepts (average and marginal,) which purpose is to comprehend all elements of revenue and complementary cost in one inclusive expression. I select land inputs as the independent variable here because land is my present subject. One could make any other input the independent variable and not change the final conclusions.

As to the significance of acreage reductions in revealing marginal rents, the definitive study of that question, or any study, has yet to come to my attention, and my allegation, consisting of one sentence, was more muted than the vigor of Professor Loftsgard's refutation would suggest. I do attach weight to the general observation that acreage cutbacks are easier on large, land-prodigal farmers than on smaller, intensive farmers. Professor Loftsgard might still be proven correct when that definitive study shall have been released, but, if so, probably not for the reasons he gives. I question if there has been historically much positive

[21]The proper treatment of interest in this scheme is too controversial to develop in this brief reply. For present purposes, assume it is netted out.

correlation between acreage cutbacks and price increases: price supports have come first, and acreage controls followed later. "Advances in technology" is better phrased I think as adoption of known technology, and adoption of land-saving techniques is an obvious consequence of acreage cutbacks, not an exogenous variable. He is right, I am sure, about the selection of poorer acres to idle, and allowance must be made for that. In how many cases, though, are the "poorer" acres poorer in location relative to a large farmstead, rather than in soil qualities?

The hypothesis that the marginal net revenue productivity, or marginal rent, of land tends to be lower on larger farms receives tentative support from two or three recent studies contrasting participants and non-participants in the Soil Bank Programs.[22] These programs provide an almost perfect testing ground for the hypothesis, since participation is voluntary with the landholder, and involves marginal adjustments of the land input, holding others more or less constant. Landowners had the option of leasing cropland (With proper histories of allotment crops) to the Soil Bank for short terms to hold idle, or to improve. Payment rates are adjusted (with dubious precision) for quality of land. Farmers naturally bank those lands whose marginal rent, to the individual farmers, falls below the government offer.

The three studies cited found participating farmers to average significantly larger in acreage, and in cropland acreage too, than non-participants. That is hardly consistent with the now orthodox view that larger farmers are the ones who make most "efficient" use of all the resources at their disposal, including land. Many participants gave such reasons as: "needed income to pay real estate taxes;" have too much land to cultivate;" "labor is hard to get;" "land is too far away to operate;" etc.[23] Non-participants, on the other hand, "needed all their cropland to operate their farms efficiently."[24]

It is not possible to evaluate the ARS study of ten Great Plains states which Professor Loftsgard leans on without citing. It is not even clear if its definition of "concentration" is at all the same as Lorenz'. But if Professor Loftsgard purports to allege that the Lorenz Concentration Ratio for U.S. farm land has not been rising, he is mistaken. I have computed the ratio from the U.S. Census of Agriculture from 1900 to 1950, and it rose from .58 in 1900 to .70 in 1945 and 1950. That is for the land in farm operations (not ownerships,) measured in acres (not dollar value.) If the acres had been weighted by their value, the increase would have been more striking. The value per acre of farms of 1,000 acres and larger increased 4.7 times, compared to 3.4 times for all farms, (including the group of 1,000 acres and larger.)

Rising Lorenz Concentration Ratios result from a rise of acreage in very large farms, largely those of 1,000 acres and more; and also from a rising *num-*

[22]THE CONSERVATION RESERVE PROGRAM OF THE SOIL BANK. Ag. Info. Bull. No. 185, F.E.R.D.—A.R.S., USDA, March, 1958 Johnson, Ralph D., THE CONSERVATION RESERVE PROGRAM IN NEBRASKA, SB470, Nebraska A.E.S., and F.E.D.—E.R.S., USDA, February, 1962.

The Chicago Fed's AGRICULTURAL LETTER for May 13, 1960, also cites an Iowa study showing a mean acreage for participants of 263, and non-participants 214.

[23]THE CONSERVATION RESERVE PROGRAM, p. 10

[24]*op. cit.*, p. 20

ber of very small farms. The technological determinists have sought to circumvent this latter difficulty by defining the growing numbers of miniature farms out of existence. They are "not important", because they produce so little. They are not "really farms," but workers' garden plots. But that is indefensible. The less they produce, the more eloquent witness they bear of the unequal distribution of farm land, which is after all the questions before us. Small farms have always been part-time farms, probably always will be, and have played an important and conspicuous role throughout economic history. For that matter, many of the largest farms are also part time. Their owners are bankers, congressmen, railroads, oil companies, international playboys, and a host of things. In both cases the non-farm interests have a dominant impact on the individuals' behavior in the market for farm land, and it is little else but willful myopia to exclude them and their non-farm interests from analysis of factors determining the pattern of farm sizes.

Both Professors Kaldor and Loftsgard have been too hasty, it seems to me, in rejecting concepts and propositions with only superficial examination that often entailed confusing the incidental with the essential and have substantially misinterpreted what the writer was struggling to express. I plead guilty to the misdemeanor of inadequate, sometimes misleading and perhaps even incendiary exposition, but innocent of the major felonies charged.