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THEORETICAL ANALYSIS OF THE PROBLEM OF PUBLIC TENURE OF GRAZING LANDS AS A BASIS FOR EMPIRICAL RESEARCH

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The motif of this paper is an attempt to silhouette analytically some significant problems encountered in public tenure of grazing lands which may be amenable to solution through empirical research. It is evident that the analytical scope must encompass the operation of immediately relevant private as well as public economic units including relationships among them. The paper is directly concerned with the problem of research appraisal of the efficacy of land tenure institutions vis-a-vis criteria of economic efficiency, but relatively infrequently will the term land tenure explicitly appear in the text. This result is not intended to connote my evaluation of the relative importance of land tenure per se, but is rather a by-product of the approach I have chosen to utilize in this presentation.

Thinkers in the area of land tenure commonly enumerate a number of concomitant ends of land tenure institutions. Objectives frequently listed by them include security, stability, efficiency, equality, and others. This study, however, is addressed primarily towards possible relationships between land tenure institutions and the achievement of the objective of optimum economy of resource utilization, i.e., optimum economic efficiency. When concepts of economic efficiency are relatively comprehensively formulated, however, there may be less conflict between this objective and other goals of land tenure institutions than many appear to believe. This approach is adopted partly because of the impossibility of discussing even this tenure facet adequately within the confines of a short paper and partly because of my belief that efficiency rates extremely high among our values in spite of being ostensibly an attribute of means utilization. Patently an economy operates within its complete culture matrix, is a part of it in fact and in its operation is inextricably enmeshed within it. Comprehensive optimum social efficiency may involve pari passu optimum economic efficiency and vice versa. Nevertheless, for the purposes of this discussion I will abstract from other land tenure objectives, and largely from the cultural matrix, in order to focus on relationships between principles of economy of resource utilization and fruitful research in the area of public land tenure.

This analysis begins with the funamental proposition that a central economic problem of any society is the allocation of available resource means among competing ends in such a manner as to satisfy these ends as fully as possible. This generalization appears equally valid within either a static context or within the framework of an evolving (growing) economy. 1/ A model solution of this problem is achieved when an economy operates in ubiquitous harmony with principles of optimum economic efficiency. This manner of operation obtains, of course, when each economic unit operates in an optimum fashion and when, concomitantly, interunit coordination is perfect, i.e., when long-run equilibrium adjustments are ubiquitous throughout the economy. With relatively minor additions the perfectly competitive static general equilibrium model appears to delineate a model of optimum economic efficiency within a growing economy as well, although its already high degree of abstraction probably increases by this extension. 2/ In this paper some relevant data will be scrutinized vis-a-vis

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1/ Cf., Carroll R. Daugherty and M.R. Daugherty, Principles of Political
Economy, Houghton Miflin Co. 1950, Chapter 23.
2/ Ibid.

efficiency models in search for evidence of maloperation of the component of the economy under examination sufficiently important to warrant further study. The emphasis will be on possible tenure contributions to the probable ineffic- iencies of resource utilization uncovered via this analysis.

There is, I believe, a close correspondence between the load placed on land tenure institutions and the ability of our economy to operate at stable, growing full employment levels. This point cannot be developed here, but a few comments will serve to illustrate this contention. If secular unemployment obtains, there tends to be chronic "uneconomic" pressure on land, e.g., and on the institutions through which its productive utilization is achieved. Under- employed and unemployed labor tends to accumulate in agriculture worsening combinations of resources and competing excessively for relatively scarce resources, both public and private, with attendant pressure on tenure structures. On the other hand, if buoyant full employment persists, nonoptimum tenure arr- angements may, among other effects, impede resource mobility and consequently hamper achievement of optimum total-economy economic efficiency. In addition, violent instability of major aggregates may influence the operational efficacy of tenure institutions in various ways. It may render "tenure problems" rel- atively insignificant in an economy beset by obviously more important problems such as mass unemployment and thus slow up tenure evolution. Or, macroeconomic instability may generate additional widespread insecurity which further analysis may well reveal to be basic to many problems now attributed to malfunctioning of tenure institutions.

In developing this analysis of western land tenure vis-a-vis criteria of economic efficiency, I will begin with brief examinations of intersector and intrasector resource allocation. This will be followed by brief discussions of immediately relevant classes of economic units and some possible relationships of their policies, and of land tenure institutions, to effective coordination among them. The use of data will be minimized throughout; no effort is made to marshall comprehensively available empirical information since that is not the purpose of this topic. The explicit references to theory are made only for the purpose of revealing some of the tools of analysis utilized in arriving at my conclusions.

In general, agriculture of the eleven western states is highly productive relative to that of most other agricultural regions in the sense of value of output per man or per farm. This does not demonstrate, however, that western resources are utilized in an optimum manner either in an intersector or intra- sector context. In spite of the relatively high average productivity of west- ern agriculture, economists have assembled considerable evidence suggesting significant malallocation of western resources vis-a-vis efficiency criteria.[1] Dr. T. W. Schultz [2] states that the value added per employee in western manufacture exceeded that of western agriculture by 2.5 times during 1939. In that year value added per man equivalent in western agriculture averaged about half of the national average for employees in manufacturing industries. Clawson [3] states that in 1929 nearly half of all western ranches were smaller than one man could operate with a little additional seasonal labor. He further opines that this situation may not be far different currently although, of course, the general price level is much higher. Other data of a similar nature

[1] That factors should be allocated so that earnings are equal in all alter- native employments for comparable resources, etc.
[2] T. W. Schultz. Production and Welfare of Agriculture, Macmillan Co., New York, 1949, p. 57.
[3] Marion Clawson. The Western Range Livestock Industry, McGraw-Hill Book Co., 1950, pp. 188-189.

suggesting malallocation of western resources in an intersector context exist, but this is sufficient for my immediate purposes.

The efficiency model requires comparison of marginal returns of comparable factors, but this variable has not been quantified. Furthermore, precise comparison of earnings requires, among other things, adjustment for nonmonetary cost and income. Other qualifications also need to be made, but it is my belief that the probability of significant intersector resource malallocation in the western states is sufficiently large to warrant further research. The paramount question at issue here is: In what manner amenable to empirical research investigation do land tenure institutions contribute to the problem of efficient resource employment in an intersector context?

Not only is there compelling evidence of intersector discrepancy of factor allocation vis-a-vis efficiency models, but similar data suggest that intra-agricultural sector allocation may be far from optimum. Data published by Schultz 1/ suggest geographical allocation discrepancies and more detailed scrutiny of western agriculture would doubtlessly reveal significant intra-agricultural interindustry malallocation. Within the western range livestock industry, for example, there exists a wide distribution of gross incomes. Clawson 2/ quotes 1929 Census figures, which he believes continue to be fairly representative (when adjusted for price level changes) to illustrate this point. For that year approximately one third of the ranches fell below $1,500 in gross income, the middle third ranged from $1,500 to $4,000 while the upper third (about 38 per cent) had gross incomes above $4,000. For that year, too, one fourth of Arizona ranchers had gross incomes below $250 while 7 percent of all ranchers had gross incomes in excess of $20,000. We note again the absence of data of marginal returns which are the variables compared within the efficiency models.

A wide range of gross incomes within an industry does not necessarily mean that economic inefficiency is rampant. There is, for example, without an assumption of entrepreneurial and land homogeneity, no single optimum scale of firm within the ranch industries. It is assumed here that entrepreneurial capacity is in practice a critical determinant of optimum scale of ranch. The attributes of the land may also be strategic in this context. It seems, however, extremely unlikely that the current distribution of ranch scales coincides with the distribution of current optimum scales. The scale attribute will be further considered below. The possibility persists, however, that much resource malallocation exists within western agriculture including the ranch industries. Among the elements contributing to this probable situation is that of tenure, both public and private.

Productive factors are, of course, not administered by broad sectors or by industries. Resources are administered by economic units both public and private and increasingly in combination. Furthermore, discrepancies of resource allocation emerge, analytically viewed, as a result of maloperation of economic units vis-a-vis efficiency criteria. In order to fix more precisely the probable "locations" of inefficiency of resource allocation and relationships to land tenure in the area under scrutiny, it is necessary to examine in more detail the economic units involved. A brief discussion of firm operation will be followed by a preliminary analytical examination of certain relevant public units. The concluding section will explore some problems of optimum coordination of

1/ Schultz, op. cit. pp. 49-63.
2/ Clawson, op. cit.

resource administration in a context of mixed public and private enterprise.

Criteria for efficiency of firm operation are familiar and well established in an abstract theoretical sense. When perfect competition is assumed, a firm and an industry are operating with peak effectiveness when long-run equilibrium adjustments obtain. This, among other things, requires a firm to be of optimum scale and to be operating with the least cost combination [1] of resources and producing at the long-run normal price within an economy similarly adjusted. As mentioned above, all ranches do not have to be of the same size in order to fulfill these criteria.

The data quoted above from Clawson strongly suggest that departure from optimum scale(s) of ranch operation may be widespread in the ranching industry. It will be recalled, for example, that Clawson believes nearly one-half of all ranches to be below one-man size. Hoglund and Johnson [2] include among their recommendations for major adjustments for South Dakota ranchers an increase in size (both acres and livestock numbers) of a large proportion of ranches. There is also reason to believe that a considerable number of ranches are larger than optimum in a welfare economic sense. It is not my contention that these data prove significant scale discrepancy; hence, inefficient resource utilization in ranching from this cause. I do believe, however, that sufficient important evidence exists to warrant comprehensive empirical research into ranch scale vis-a-vis optima and its relationship to private and public tenure conditions and practices. If considerable underemployment of labor and entrepreneurial resources exists, this tends to increase the stress on tenure institutions and pressure on public resources.

Another important possible contribution of tenure institutions to scale discrepancy may exist in a progressive context. The optimum scale of ranch appears to increase historically in a progressive economy. It is probably that comparative inertia in tenure institutions seriously impede adjustment of ranch scales to increasing optima and that actual scales fall progressively below optima. Internal and external capital rationing may also be important in this context. [3] The chronic complaints of ranchers regarding insecurity in grazing permits is a case in point.

A brief consideration of optimum combinations of factors may also suggest possibilities for significant empirical research into public, private, and combination land tenure problems. An optimum combination is achieved when marginal products are proportional to respective factor prices when these factor prices are, themselves, long-run normal factor prices. Obviously, the ranch industry could not at any time be expected to approximate closely these conditions, but major and/or chronic maladjustments may exist which are ascertainable and remediable.

One line of approach is through the conceptual vista of capital rationing. [4] What influence does insecurity in tenure of public lands have on combinations of factors? Another line of evidence consists of investigating

[1] In the long-run optimum scale is also a problem in factor combination.

[2] C. R. Hoglund and M. B. Johnson. Ranching in Northwestern South Dakota. Brookings (Agr. Exp. Sta. Bul. 385). p. 31

[3] Cf. D. Gale Johnson. Forward Prices for Agriculture. The University of Chicago Press.

[4] Ibid. Chapters 4 and 5.

complexes of factor prices facing ranchers. Dr. Vass 1/ has demonstrated that "prices" of twelve months' feed per animal unit on Wyoming ranges varied from 60 cents on Taylor Grazing District Land to $5.32 on privately owned lands during 1940. Obviously, if these costs are for roughly comparable factors, as they seem to be, incentives would exist encouraging distortion of factor combinations vis-a-vis optima within these ranches. This, I believe, is another area in which empirical research can make positive contributions towards increasing the efficiency of western ranch operation and to which resource administration by public units is intimately connected.

Another important problem in effective factor combination for ranchers is the temporal one. Some of the factors used in ranch production are not seasonally homogeneous. This is particularly evident in the case of land which is to a large extent seasonally specialized, for example, into winter, spring-fall, and summer range. Achieving a balance of forage production throughout the year is a major problem in ranch operation. There is considerable evidence of forage bottlenecks in many ranch areas with attendant increased pressure on (seasonally) relatively scarce factors. This is another facet of the general problem of achieving optimum efficiency of ranch operation which may amply repay research attention. The contributions of a mixed public and private land tenure structure to apparent persistence of seasonal malcombinations may be significant. This topic of land tenure and effective ranch operation will be taken up again below after a brief sortie into the imbroglio of public resource administration.

This short consideration of principles of public resource administration and their relation to economic efficiency is perforce both abstract vis-a-vis realism and elementary in comparison with the actual operating complexity faced by public administrators of even relatively uncomplicated public units such as the Forest Service or Taylor Grazing Districts. I believe, however, that even this first approximation analysis will more clearly reveal facets of the tenure problem likely to be less sharply outlined by a nonanalytical approach. If the objective of administrators of public resources is to produce the optimum structure and level of output (in harmony with citizen sovereignty) from the factors under their jurisdiction they are confronted with the necessity for making, among others, the following mutually interdependent decisions. Output, of course, has to be sufficiently comprehensively defined to include "intangibles" such as scenery. Public factors in this highly oversimplified version have to be allocated between net investment and production for current consumption including factor maintenance (conservation). The resources assigned to current output have to be allocated among alternative competing goods, including for the Forest Service, forage, water, recreation, and timber. This problem is probably most frequently referred to as that of multiple use. In addition, the output of forage must be divided among competing ranchers. The factors assigned to net investment must also be divided among the relevant alternatives; an optimum solution of this allocation problem is even more complex than for current output for consumption 2/. Many critics of government operations apparently fail to fully appreciate the complexity of the administrative imbroglio intervening between "bureaucrats" and the achievement of economic efficiency. At a minimum the models vis-a-vis which actual performance is often deprecated should be explicitly stated by the analysts. Economists here have a fertile field to develop. The relevant advisory boards would doubtlessly also welcome concrete assistance

1/ A. F. Vass. The Classification of Land. (Missouri Bul. 421) p. 232.

2/ Consumption in this framework includes raw materials to be processed for "current" consumption.

in this area.

Abstracting from the questions of "practicality" and relevant degrees of detail the model solution for optimum operation of public units, in the sense used above, is also embodied within the paraphernalia of marginalism. Assuming that an optimum quanta of resources of the right qualities has been allocated to the sector in question optimum public factor utilization is also achieved when resources are allocated in such a manner as to equalize (discounted) net marginal value products from alternative goods produced by homogeneous factors. 1/ For a national forest this would mean that land of a certain quality should be allocated among the outputs--forage, water, recreation, and timber-- so that the discounted net marginal value product is the same in each use. I repeat that this is a statement of principle not an evaluation of the efficacy of this model as a guide for making day-to-day administrative decisions.

Economists would obviously contribute significantly to the improvement of public sector operation and pari passu to the solution of related tenure problems if they could forge empirically effective criteria for achieving optimum efficiency of public unit operation. It is not helpful to exaggerate, however, the difficulty of this undertaking relative to its counterpart for the private firms. These two problems have much in common. National forests and Taylor Grazing Districts, for example, have production functions, factor prices (some implicit, others explicit) and in some cases revenue functions, i.e., many of the phenomena encountered and ostensibly summarized in the theory of the firm. The problem of conservation is analogous with that of plant maintenance. Net investment is similar in principle for both sectors. It is evident, however, that in spite of considerable analogical symmetry the theory of the firm as currently constituted cannot serve as a guide for day-to-day operation of say, the Forest Service. As aggregate public production increases and government participation in private firm operation grows, a criterion of effective public unit operation becomes progressively more imperative.

The relevant public units commonly produce a set of products such as forage and timber; they do not commonly allocate their factors as such to be used by private firms. After the products are produced they are "sold" to private units which use them as factors, i.e., process them further or consume them on the spot, for example, in the case of scenery. Most of the demands facing these public units are derived demands or sums of the relevant marginal value product curves of the firms in the "markets" for these products. These exist (as for private firms) for forage, stumpage, and water in some cases, but for the "free" goods such as recreation the lack of a product price eliminates the market de- rived-demand curve facing the public firm. To achieve an optimum allocation in theory under these operational circumstances is to my knowledge unsolved, yet the administrators do have to make these decisions in their everyday operation. The public units are obviously not the exclusive suppliers of these products; they are in active competition with private firms in the same industries.

To obtain an optimum structure of net investment is again relatively simple in theory, but "difficult" in practice. When one visualizes the array of relevant demand determinants and their possible temporal dynamics the problem

1/ Cf. Abba P. Lerner, The Economics of Control, Macmillan 1946 or Daugherty and Daugherty op. cit. for details.

of accurate prediction appears insuperable yet prediction is of necessity made regardless of its degree of informality. Who would care to estimate the drift of income elasticities of demand for the products of Modoc National Forest for the next 20 years? At this stage in world affairs one may even need to revise one's expectations regarding a high and increasing income elasticity of demand for recreation goods in the United States.

The fact that the theoretical and practical achievement of optimum management of these resources is difficult does not mean that this is of little importance or interest to the consumers and firms involved. The general public has an intense interest in optimum outputs from public production. The interest of ranchers is even more direct since the profitability of their own operation is interdependent in various degrees with the allocations actually made by the public units in the present and on the structure of net investment which within a few months or years affects the quantity of forage available to them.

At least implicit in this relatively short section on public resource management are important suggestions for economic research. The public managers as well as the advisory agencies and related officials should be provided criteria which are empirically applicable while the current sterilizing degree of abstraction of the relevant theory persists. In addition, basic research and thinking needs to be done on the increasingly important problem of formulating a more realistic guide for efficiency of public unit operation

Many "tenure" frictions arise in the interaction nexi between public landlords and private ranchers. Much friction (probably more) would arise even if the public sector were operated in complete conformity with principles of economic efficiency in the welfare context since human nature is not a variable completely dependent upon economic efficiency. This concluding section explores preliminarily the quality of the achieved meshing of public and private factor use decisions vis-a-vis the optimum suggested above. While in the background of this discussion is always a context of all units of the economy ubiquitously operating in harmony with a total-economy efficiency model (general equilibrium model), it has been necessary to make sorties of a partial equilibrium nature into stategic areas for analytical purposes.

It is evident that optimum efficiency of operation of both relevant ranchers and public units is prerequisite to achieving that ideal in either one. No ranch dependent on public resources could achieve an optimum combination of resources unless allocation on the part of the public unit involved was in conformity with its needs thus defined. It appears to me that research into the degree of harmony in fact achieved by the allocation policies of public administrators vis-a-vis standards of ranch efficiency would be very fruitful. It appears important to know to what degree forage allocation facilitates or impedes achievement of optimum ranch scales. Since optimum ranch scale is a dynamic variable the question also arises whether public range management decisions adjust for this factor or whether discrepancies between actual allotment policy and ideal policy according to this criterion is increasing historically. In addition, the degree of correspondence between public and private firms decisions relative to optimum combinations of factors is replete with research facets. The data from Dr. Vass' study quoted above suggest that the "pricing" policies of the various relevant factor owners diverge widely, some being relatively underpriced and others relatively overpriced. This provides a positive incentive for private ranchers to achieve an optimum combination from their profit maximizing calculations which probably deviates widely from the welfare optima delineated by

efficiency models.

This pricing or fee aspect is highly interesting in the light of some current public land problems. It is well known that when an administered price is set below the respective equilibrium level the pheonomenon of rationing scarcity arises. Old buyers tend to purchase more at this lower price and formerly marginal demanders enter the effective market 1/. The relationship between fee policies of public agencies and pressure on their forage resources merits further investigation. It is widely believed that "subsidies" to private ranchers through charging less than equilibrium fees have been capitalized into higher land prices, hence implicit and/or explicit land cost of ranch output. An implication of this of some importance appears in the division of management on the part of the rancher between attention to privately owned land and his allotment. It is rational for the rancher to combine relatively more management with the relatively costly factor which may be subsidy inflated, privately owned land and less with the (possibly) underpriced public resource. This may not provide adequate incentives for optimum use of public forage supplies.

There is a wide range of similar problems meriting empirical research attention. The relationship of internal capital rationing and lack of security of expectations with regard to permit continuity may be a source of widespread inefficiency in the ranch industries. In addition, private operators may be reluctant to invest in improvements on the public ranges because of tenure expectations and also because of the prevalence of common use. Meshing private investments in private lands with public investments in public land in such a way as to promote continuously optimum adjustments is also an important problem. This is by no means a complete or even comprehensive list of research possibilities, but illustrates types of problems with tenure implications that can be approached within an efficiency context. Even if the efficiency models are comprehensively formulated, however, I do not suggest that this vista precludes significant contributions from thinking and research formulated within a different analytical or institutional framework.

Several generalizations appear appropriate in conclusion. The type of analysis employed in this paper needs extension in penetration, detailed examination of classes of units and coordination among them, and in consideration of other objectives of land tenure as related to economic efficiency, among other things, but patently it soon reaches a margin where other studies yield higher products. Further detailed empirical research into ranch structure and operation needs to be made and of relationships of tenure institutions to these. This also needs to be done for public units and for interunit coordination since obviously practical optimum ranch operation in cases where public grazing is important cannot be reached through adjustments within ranches alone. Finally, I cannot overemphasize my estimate of the importance of pure research in agricultural economics. Research in agricultural economics can be too "practical" to be practical.

1/ Cf. Mont. H. Samuelson, Western Land and Water Use, University of Oklahoma press, Chapter 4.