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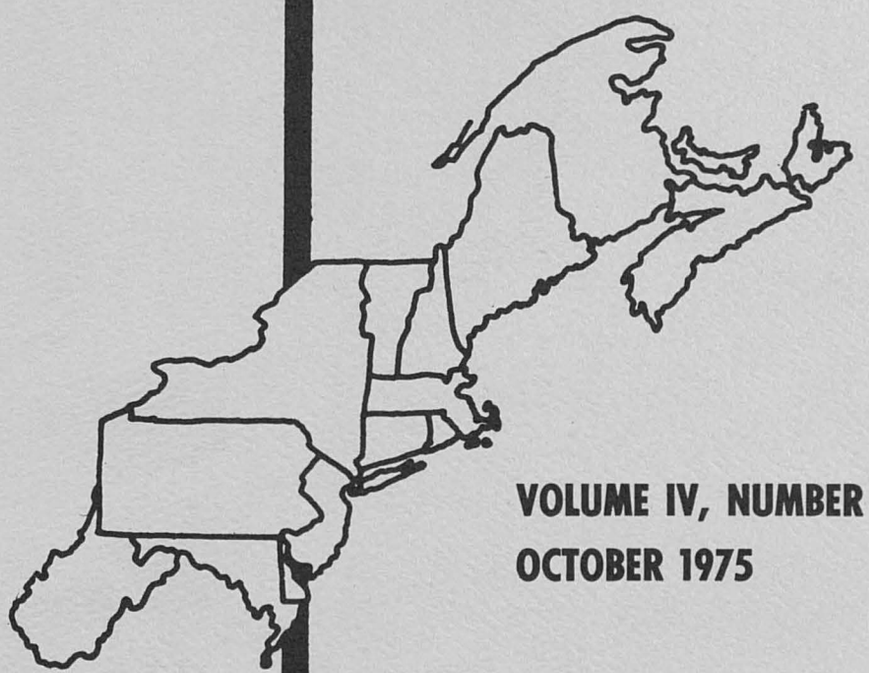

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ECONOMICS OF COMPENSATION IN DEVELOPMENT RIGHTS PROGRAMS

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Interest in land-use planning and control in the United States has recently shifted to a variety of non-conventional tools in an attempt to attain results that have eluded older techniques such as traditional zoning. A major land-use objective has been to continue certain existing land uses in the face of market pressures to convert to more intensive uses. This has been the case, for example, with ecologically fragile areas such as wetlands, or environmentally valuable areas such as scenic land, which are also economically attractive for development into housing or industrial property. In recent years interest has also turned to preservation of agricultural land, particularly in areas near urban concentrations that are feeling the effects of urban sprawl.

A major problem encountered by the traditional zoning approach has been the taking issue. Zoning amounts to the simple proscription of certain land uses via the police power. If this proscription seriously impairs private economic values without sufficient public purpose, however, it may be deemed an unconstitutional taking of private property [9, 11]. The zoning approach, therefore, has not proved flexible enough to handle many recent land use problems.

A major effort is currently underway to supplement the zoning approach with some sort of compensation to landowners whose land-use options have been constrained. It is hoped thereby to avoid the taking issue, since compensation can be made to offset the decline in economic values experienced [1]. Interest centers on the isolation of the development right in land; that is, the particular "stick" in the "bundle" of property rights associated with converting the land to more intensive uses. A number of programs have been proposed that contemplate the severing of these particular rights from the fee-simple bundle by outright purchase from existing owners, with possible reallocation and reattachment of these rights to different parcels of land [5]. Development rights programs of one type or another have been suggested for urban landmark preservation [4], control of urban building heights [7], preservation of agricultural land [3], and channeling community growth [2]. For the most part, however, the full elaboration and use of development rights programs lies in the future. That this is likely to be an active future is evidenced by the frequency with which they are being proposed, including to date proposals in the State of Maryland [8], Long Island [14], Colorado [10], Fairfax, Virginia [13], Sunderland,

Massachusetts and probably many other places.

The motivation behind development rights programs stems from desires to keep land from being converted to more intensive uses in the face of economic pressures in private land markets. Most development rights programs begin, therefore, with the identification of certain lands deemed appropriate for preservation in undeveloped status. Presumably this could be directed at all land within a certain region (e.g., all land in a given portion of a community) or all land in a certain use (e.g., all land in agricultural production). The objective is then to arrange for the purchase of all the development rights currently attached to this land so as to compensate the owners of that land for loss in value resulting from the restrictions on use. At this point there is a major problem. The legal and economic success of development rights programs will depend in large part on the degree to which proceeds of the sales of their development rights is deemed adequate to compensate landowners for loss in land value. On the other hand, the proceeds realized will depend on the institutional means established to purchase these rights from their owners. Thus the "taking" issue persists; we must define the concept of a development right so that we can evaluate its economic value under varying circumstances so that, in turn, we can draw judgments as to the extent that various types of development right purchase programs exceed or fall short of the appropriate amount of compensation.

In what follows certain conclusions are educed about compensation in development rights types of programs. These conclusions are fairly simple. The success or failure of development rights programs will depend in large part, however, on whether these simple matters of compensation are worked out in practice. Because of space limitations, and because the total problem needs to be disaggregated for intensive study, we focus only on one side of the development rights "transfer" approach, the side associated with purchasing of development rights from their existing owners.

To illustrate these ideas we consider a farmer who uses a quantity of land in his production operations. We simplify by assuming that he is one among many decentralized holders of development rights in a large and relatively undeveloped region. This means that buyers have a large array of alternatives and rules out game-theoretic activity among existing holders of development rights. We wish to consider how this farmer will respond to different types of offers made to him by development rights purchasers.

For our farmer we assume a neoclassical production function in which land enters as one of his inputs. Over the relevant economic range land will be subject to diminishing marginal productivity. We thus draw, in Figure 1, a conventional downward sloping long-run value-

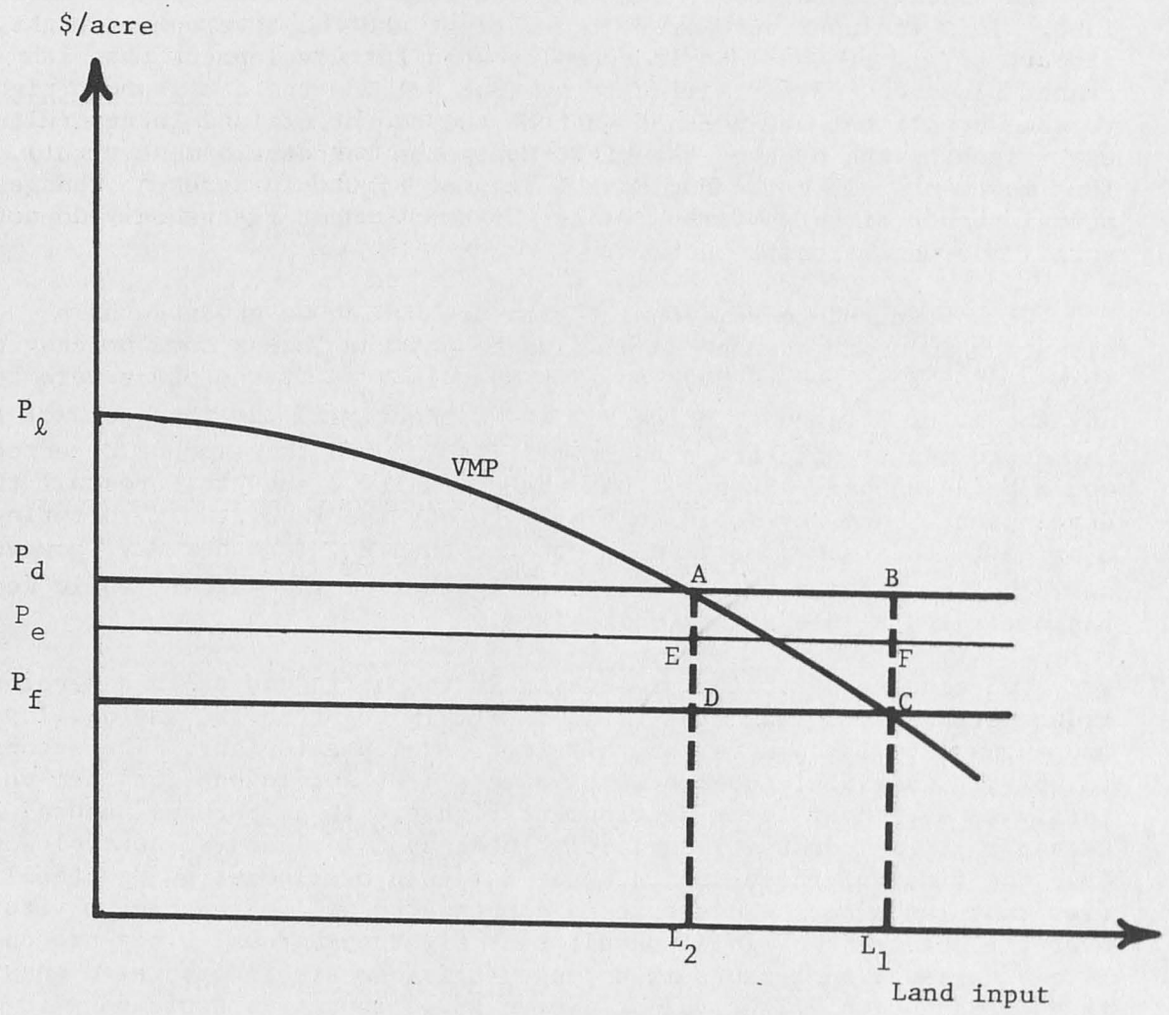

Figure 1: Compensation Possibilities of Development Rights Sales

of-marginal product curve for land.[1/] We assume, further, that the farmer currently has a farm size of L_1 acres, which we consider to be the result of decisions made in past years. The marginal value of land at this point is P_f; we can call this the present use value of land.[2/]

We assume at the beginning that the farmer holds all rights in the land. This includes both present use right and the development right. If part or all of the land is actually sold for development that land cannot also be used for agriculture. But selling the development right to some or all acreage does not affect the amount of land in agricultural use (assuming the present use right dominates the development right). Thus movements along the horizontal axis of Figure 1 represent changes in actual number of acres farmed; sale of development rights only do not entail movement along this axis.

We now introduce development pressure, which we envisage as a situation in which someone is willing to pay the farmer some price greater than P_f for farmland to develop, for example P_d. If the offer were for any amount of acreage at price P_d, it is clearly in the interests of the farmer to reduce his farm size from L_1 to L_2, and this amount of acreage would be developed. Suppose that the community wished to forestall this development. One way would be simply to buy the land itself, offering a price to the farmer marginally greater than P_d. Another way, however, would be to purchase the development rights from the farmer, while leaving his agricultural use rights unimpaired.

Two courses of action are available to public bodies in a development right purchase program. The first is simply to proscribe any development and compensate landowners for this lost development right. The second is to offer financial inducements to farmers just sufficient for them voluntarily to surrender their development rights. It is perhaps natural to reason that any community seriously interested in land use control would take the first of these approaches. But this overlooks the political fact that landowners who are to be compensated will often have a veto power over the enactment of local development rights programs. They are unlikely to favor such programs unless provisions are incorporated ensuring that compensation will equal or exceed those amounts associated with

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[1/] Since we are dealing with decisions over time, the VMP curve must be understood as being in terms of capitalized income streams, either total or annual equivalent. The fact that this is a long-run VMP implies that all other profit maximizing input shifts are assumed to be made as the land holding changes.

[2/] Note that a use-value of P_f does not necessarily require that a market for land for farming exists. A farm size of L_1 acres is the optimal size, however, in a situation in which P_f is the market price for land.

voluntary divesture of development rights. Investigation of the two approaches, therefore, amounts to very nearly the same thing.

What is the lowest value associated with the right to sell $L_1 - L_2$ acres to the developer? This is found by subtracting from the proceeds of the land sale, ABL_1L_2, the aggregate loss in income from farming stemming from having fewer land inputs, ACL_1L_2. The difference is depicted by the area ABC. By continuing to farm L_1 acres and taking a sum equal to ABC for just the rights to develop the $L_1 - L_2$ acres, the farmer realizes an income just as high as if he actually sold off the acreage and operated the smaller farm.

It is to be stressed that the sum depicted by area ABC is the offer that will forestall development on the specific $L_1 - L_2$ acreage.[3/] This is in contrast to a regime where a buyer offers a single price per acre for each and every acre of development right sold by the farmer, up to and including his whole farm if he should so desire. Setting this price at $P_d - P_f$ would motivate the farmer to continue farming L_1 acres, but unless there were a limit placed on the number of development rights purchased from him there is nothing to stop him from selling the development rights to his entire acreage. This would give him an added income of P_dBCP_f, stemming from his selling development rights on acreage that he would not have sold for development anyway. In other words, it needs to be stressed that the offer price of P_d would not have induced the outright sale of the entire farm acreage, but only a reduction in its size from L_1 to L_2. A price of P_ℓ would have been necessary to motivate sale of the entire farm to the developer. Thus an offer of $P_d - P_f$ for development rights would induce the farmer to sell development rights, not just on land that would have been developed, but also on land that would not. This points up a problem that may need to be addressed in specific empirical instances of development rights programs: how to avoid paying for development rights on land that would not be converted anyway.[4/] The answer to the problem lies in designing purchase programs which make the appropriate kinds of offers to land holders for their development rights.

[3/] If amount ABC were levied as a charge on development the same efficiency result would obtain (but not the same distributive effect). In fact the process being analyzed here is very analogous to the bribes and charges analysis of environmental pollution control. Here, however, the object is to motivate a firm to use a higher input level than it would find privately profitable, whereas in pollution control the objective is to reduce the privately optimal rate of use of a resource.

[4/] One may not wish to avoid this if one objective of the program is to redistribute income to farmers.

A transaction intermediate between those depicted above is for the buyer to offer a price of $P_d - P_f$ per acre of development rights for any amount up to, but not exceeding $L_1 - L_2$ acres. In this case the farmer would continue to use a farm of size L_1 but would sell development rights on the entire $L_1 - L_2$ acres. He would realize an income from this sale of ABCD for this development rights sale, which is somewhat more than the amount ABC. This differential stems from the difference between lump-sum offers and per-unit offers as treated in the textbooks under price discrimination.

We have implicitly assumed so far that the farmer owned development rights in proportion to his acreage, in fact we have assumed one development right for each acre owned. This need not be the case; another approach that is sometimes suggested is to assign development rights in proportion to value of the development option, the value corresponding to the area ABC in Figure 1. The best approach depends in part on the institutional mechanism that is established for buying these rights. If they are to be purchased by the public sector then price is a matter of direct manipulation and can be set differently for each landowner. In this case development rights assignment on the basis of acreage is sufficient, for their price can be varied to permit varying amounts of compensation to different farmers. If a full-scale market is to be established for development rights, such that the interaction among buyers and sellers is expected to yield a single market price, then the original assignment will need to be made in proportion to aggregate value if compensation is to be tailored to the value of each owner's development rights.5/ This is likely to be very tricky, for unless just the right number of development rights are assigned to each owner the offer price for development rights either will not remove the incentive to develop various pieces of land (if too few are assigned) or will foster overly lucrative compensation to owners of other pieces of land (if too many development rights are assigned).6/

Figure 1 can be used to highlight another important facet of land use programs: the difference between efficiency effects and income distribution effects. Whether the offer is amount ABC for the development rights on just the $L_1 - L_2$ acres, or a price of $P_d - P_f$ per acre for any amount of development rights, the efficiency effects are identical: the farmer ends up farming his entire acreage and developing none. But the income implications are very different. In the first case the farmer realizes a smaller increase in income than in the latter, because he is not permitted

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5/ We are making the reasonable assumption that landowners are differently situated with respect to the value of their land for both agriculture and development.

6/ The matter of fine tuning the development rights program so as just to remove the incentive to develop was a major problem in the British experience [12].

to sell development rights from infra-marginal acreage. This analysis also shows that the aggregate value of development rights, for one farmer as well as for a group of farmers, is likely to be overstated if it is measured by taking the difference between current use value and development value on the marginal acreage, and then multiplying this by the entire farm acreage.7/

An interesting result flows from the following arrangement. Suppose that offers were made for the development rights on any amount of acreage, but that a price somewhat less than $P_d - P_f$ per acre were offered, say $P_e - P_f$. Two outcomes could result. If EFCD were greater than ABC he would sell his development rights on all L_1 acres. If EFCD were less than ABC he would sell $L_1 - L_2$ acres to the developer at P_d and sell the development rights on the remaining L_2 acres for $P_e - P_f$. In this latter case substantial income would be transferred to the farmer, but the amount of farmland preserved with or without the development rights program would be the same.

The analysis so far gives some idea of the complexity of development rights purchase programs, even in the simple situations looked at. In the real world they will be substantially more complicated owing to factors we have assumed away, such as uncertainties with respect to future prices for developed land and for agricultural outputs and inputs, and the interplay of development rights programs with various types of preferential tax programs. Another matter that we have so far suppressed by assumption is interactions among sellers. Development rights purchase programs are very likely to generate all kinds of interactions and mutual interdependencies among existing development right owners. Part of the uncertainty regarding future returns is likely to result from uncertain land-use decisions by neighboring landowners. These external effects could take both pecuniary and technological forms. The pecuniary effect resulting from a series of development rights sales results from the fact that as additional development rights are purchased the land remaining on which development can take place becomes increasingly scarce. Additional increments of development rights can be expected to be more costly than previous increments. Furthermore, this pecuniary effect may be reinforced by a technological effect, or externality proper. The fact that an area has been set aside for open space may serve to convey a real increment in value to neighboring parcels because living or working on those parcels is now more pleasant. The fact that some open space has been preserved would in most cases increase the stream of future rents on neighboring developable properties.

7/This method of valuation seems to be implied in [3].

Pecuniary externalities are likely to produce special problems for development rights programs. This is illustrated with the use of Figure 2 which depicts the land VMP curves for two farmers. Farmer A has a present farm size of L_1^A and farmer B of L_1^B. The present use values at the margin are respectively, P_f^A and P_f^B. The development values are P_d^A and P_d^B and these are for individually developed acreage, i.e., P_d^A is the price that a developer would offer to farmer A provided there were no development on farmer B's land, and vice versa for P_d^B. We now assume the following sequence of events: a developer offers farmer A a price of P_d^A per acre for land on which to develop. The community wishes to forestall any reduction in agricultural acreage, and achieves this by compensating farmer A in the amount ABC for development rights on acres $L_1^A - L_2^A$. The developer is then deflected to farmer B, and, since development is now precluded on A's holdings, is willing to offer P_d^B for acreage sold to him by farmer B. Again the community wishes to stop development, and does so by compensating B in the amount DEF for the development rights on acres $L_1^B - L_2^B$.8/ The total compensation paid by the community is, therefore, ABC + DEF. This sum is more than the gain in farmer income that would have arisen if the community had simply taken a laissez-faire attitude and allowed development to proceed unhindered. In that case <u>either</u> P_d^A <u>or</u> P_d^B would have materialized, but not both.

In this paper we have sought to clarify some basic economic issues surrounding the purchase of development rights from landowners. The treatment has been very simplified; we have not dealt with a host of complicating factors that are present in the real world. Nevertheless we hope that we have achieved something in terms of depicting the fundamental land compensation problem and some of its less involved extensions.

A major conclusion is that compensation programs like this, while they may sound reasonably simple on paper, actually can be very complex. Armed with this beginning, however, we ought to be able to push on and resolve many of these complexities.

8/Area DEF is interpretable as the "shifting value", in British terms, another source of difficulty in their development rights compensation and charges programs; see [12, p. 300].

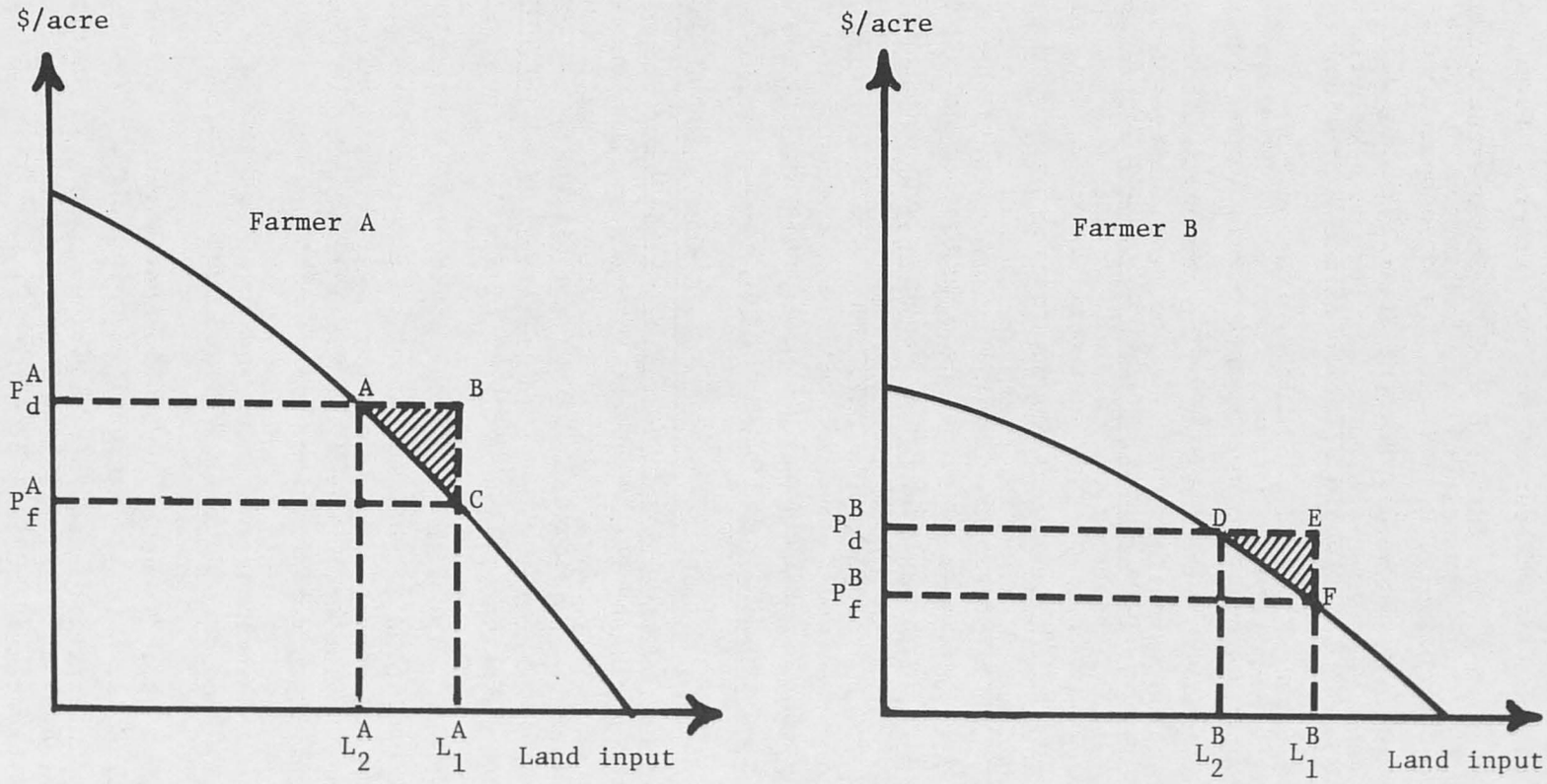

Figure 2: Interaction Among Development Rights Owners

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