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MANAGING COMMON-PROPERTY RESOURCES:
AGRICULTURAL LAND IN COLONIAL NEW ENGLAND*

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I. Introduction

It is an interesting historical fact that New England farmers in the early colonial period utilized most of their agricultural land in common. The impression given by many writers is that the time was very brief during which land was used in this way; privatization is implied as occurring quite rapidly. "Frequently the arable land was tended in common and the hay was harvested together for the first few years. However, individual property soon was established in most places and each farmer cultivated his own acres" (Harris, p. 287; see also Lemon, p. 87). When we look at specific dates, on the other hand, we could easily get another impression. In Framingham, Massachusetts, the last common land was disposed of in 1785, nearly a century and a half after this land was first settled (Bidwell and Falconer, p. 57). In Windsor Locks, Connecticut the end of land used in common came in 1752; over 110 years after the town was established (Stiles, p. 499). In Deerfield, Massachusetts, the last entry in the record book of the proprietors of the last common field is dated November 5, 1858, about 150 years after the town was permanently settled (Sheldon, p. 768). Of course, there are many other towns in which common fields and pastures moved more quickly into private

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hands. Nevertheless, use of land in common, though perhaps brief by some historical standards, was persistent enough as an institution in many communities to warrant deeper study.

In this paper we attempt to begin such a study, made possible by the abundant collection of original documents pertaining to this period. In the next section we provide a very brief historical sketch of agricultural land use in the early colonial communities, especially Massachusetts and Connecticut. In Section III we turn to the question of why the institution of land in common was adopted at that time. In Section IV we turn to an analysis of the rules and procedures adopted by the settlers to manage these common lands. In Section V we discuss the economics of the transition from common to individual agricultural land. Section VI is a summary.

II. History

The descriptive history of early settlement and agricultural land-use practices in New England has been well laid out in other sources.^{1/} Here we provide a short sketch of this history to establish the setting for the discussion below.

Apart from the very earliest communities which were established, in the absence of formal political institutions, by squatting or direct purchase from the resident Indians, most New England towns of the 17th Century were established by grants running from the colonial governments to groups who had petitioned for the right to begin a settlement. The grants indicated, usually vaguely, the area to be settled, and contained terms to be met by the grantees

^{1/} See Bidwell and Falconer, and Harris.

in order for settlers to receive permanent title to their land. These terms usually specified some minimum number of settlers required to inhabit the town and to commence improving the land within a specified time limit.

The first settlers of each community consisted of all or a portion of the original grantees (squatters in the earliest towns) together with such others as could be attracted to the settlement at its founding. One of the first tasks of the organizers of the town was to apportion the land among the individual settlers. A variety of formulas was used for making these allocations. Strict numerical equality was used in several cases, but this approach was not widespread. One common criterion was the relative amount of resources that a person had contributed toward the expenses of establishing the town. Others were size of family and social status among the settlers. But the most popular criterion for allotting land to individuals was the size of each person's "estate", i.e., the aggregate value of their property for tax purposes. Those with larger estates were given larger land grants.

A settler's land grant typically consisted of three or four types of land: home lot, land for tilled crops, meadow land, and outlying land for pasture. Meadow refers to acreage of pre-existing grasslands that the settlers found in the river valley or coastal locations to which they were drawn. The exact lots that each settler received in the initial division was often decided by some random process following identification and survey of the fields within the town grant. In most towns an individual's holdings were not consolidated at first, but instead were scattered among the several fields, or portions of fields, originally designated to be treated as a unit. The reason for this apparently was to equalize holdings on the basis of quality, even though they were not equal on the basis of quantity. Some

scattering may have stemmed also from the fact that different segments of the town were granted to the same set of individuals at different times.

Towns varied greatly in terms of the proportion of their total area granted to individuals in the first few years. Even in cases where this proportion was relatively high, however, the usual practice was to use most of the land in common.

A large number of different types of commons existed at one time or another in these early communities, based on use to be made of the land, types of rules applicable to their use, and so on. From a type-of-production standpoint we can distinguish four types of commons:

- (1) Common planting fields. One of the very first tasks facing the settlers was putting fields into cultivation. In many cases they actually took over planting fields that had been developed and used by departed Indians.^{2/} Identification of a town's planting fields was an activity usually undertaken collectively, and each settler was assigned individual plots within each of the planting fields; sometimes more than one plot per field to allow for variations in soil fertility. What made these common to some degree was that the fields were usually enclosed by a single fence to protect against livestock damage. This required some degree of coordination of cultivation duties among those having plots in a field, and also collective decisions with respect to construction and care of the single enclosing fence. In fact, it was the management of this collective fence that gave many of the towns their biggest headache.

^{2/} And in at least two cases apparently cultivated these fields in common with Indians.

- (2) Common meadow, or mowing, lands. Most of the first settlements took advantage of topography and located close to existing, naturally-occurring, lowland meadows. Their objective was to use the natural grasses as hay, to be mowed and stored for wintering livestock. The sense in which these were common fields lies in the fact that they were collectively designated by the town, even though within each field individual plots may have been designated; certainly each person was limited to a maximum number of acres within each mowing field.^{3/}
- (3) Grazing commons. Essentially all the early farmers grazed their animals in common, in areas designated for such use by the town. Milking cows were often assigned to areas close to the town centers. They were usually collected each morning at a designated meeting place and taken to pasture by a herdsman hired for the purpose. Other, usually more remote areas were designated for other types of livestock, such as dry cows, sheep and hogs. These pasture areas varied greatly in quality, some classifying as "improved" in the sense of having trees and brush removed or cut back, others consisting essentially of rough woodland. Most pastures were stinted; that is, subject to controls in the form of maximum animal numbers permitted each user. Others, especially the remote areas, were often unstinted. Planting fields and meadow lands, after harvesting, were usually opened for common, stinted, grazing.

^{3/} Meadow land grants were in terms of acres, but fragmentary evidence suggests that these were acres of mowing rights, not rights to specific meadow acres. For example, Ipswich once passed a regulation to the effect that no family could use more than one scythe at any one time.

- (4) Common timber, wood, and other forest products. The early settlers obviously were dependent on products of the surrounding forests, critically so in the case of fuel wood and building materials, but also for such items as stone and turpentine. For the most part, the woodlands in each town were exploited in common for these products, usually accompanied with difficult-to-enforce stinting rules.

As the towns began to grow, many changes occurred. New settlers were often granted land from the pool of remaining undivided land, to the extent that it continued to exist. Sometimes the new grants also contained rights to use some or all of the remaining land held in common. New commonly-managed planting fields were organized and put into production. From time to time the residents, in whole or part, laid out and divided up among themselves, large chunks of the remaining common and undivided land. Thus, the size of grazing commons began to shrink. In those communities subject to relatively great population pressure, the amount of remaining undivided land shrank quickly as land was shifted into private ownership. In most cases, however, these individual tracts were not fenced in immediately; in fact, land utilization in common lingered, sometimes for many decades.^{4/}

Privatization and enclosure of land holdings was accompanied, in many cases, by a great deal of political strife. Relatively early on, those people owning rights to the agricultural land in the town differentiated themselves from those who did not. Thus, there evolved groups, known as "proprietors of the common and undivided lands", who were initially coterminous with the group of all residents, but who became increasingly distinct as the town populations

^{4/} A few common fields persisted on Cape Cod until the end of the 19th Century.

grew. These proprietors had several functions. One was to manage the planting fields and meadows which, though consisting of individually owned plots, were cultivated in common. Another was to manage privately owned, but commonly used, grazing lands. The last was to manage the land of the town that was as yet undivided into individual tracts.

Quite clearly these groups of proprietors had a great deal of control over the developmental course of the towns, especially to the extent that the towns contained relatively large amounts of undivided land. It is not surprising, then, that early town histories are full of accounts of conflicts between proprietor groups, newcomers or residents who wanted new or enlarged land grants from among the undivided lands, people who had land but lacked commonage rights, people who had commonage rights but were not using them, and so on. Gradually, of course, substantially all of the original town land grant was transferred into private hands, and these individual plots were consolidated and enclosed, leaving a small area in the middle of town as a vestigial "commons".

III. The Institution of Common Land Use

Explanations for why the first colonial farmers used land in common are dominated by the cultural-capital model. Agriculture in many parts of 17th Century England was still being conducted with the open field systems that traced back to the manorial systems of the Middle Ages. This system, and the pattern of scattered individual holdings they usually implied, have been much studied by economic historians.^{5/} In the cultural-capital model the open

^{5/} A few works in this large literature are Parker and Jones, Thirsk, Dahlman, McClosky, Allen, Ault, Hoskins and Stamp, and Allen.

field system of England is looked on as the direct parent of the common fields of the early agricultural towns of 17th Century New England. The latest manifestation of this thesis is the work of Allen. He studies the English origins of settlers in five early Massachusetts towns. Differences among these towns, in terms of their reliance on common fields, are explained in terms of whether settlers came predominantly from open-field or enclosed-field areas of England.

There can be no doubt that accumulated cultural-capital is an important determinant of the institutional choices made by any group of people facing a new environment. But as the sole, or in some cases even the primary, tool for explaining these choices, the cultural tradition has substantial deficiencies. Suppose the new environment differs in significant ways from that of the past? Suppose the new group actually contains a mix of people with diverse experiences? How do we use this approach if we are interested in examining institutional change? With respect to the last, for example, there is something rather ad hoc about explaining institutional change with a mechanism where people from one institutional tradition die off, leaving those from another tradition with more influence.^{6/} In this case, the direction of institutional change is made to depend, rather fortuitously, on differential death rates in a population.

Still the cultural-capital model obviously is true in some general sense. By most accounts the settlers did not take up the ways of the native Americans

^{6/} Greven (p. 44) speculates that the land holding institutions of Andover, Massachusetts may have shifted when one of the town fathers, from an open-field tradition, died, leaving others, from a closed-field background, in the ascendancy.

they found here.^{7/} They did not establish the institutions they probably would have had they been French, or Spanish. But the cultural-capital model does not adequately appreciate the resourcefulness and flexibility of the early settlers, perhaps because our image of them tends to be that of a dogmatic, religion-dominated group of fanatics who were looking to establish the one-and-only correct society for all time to come.

Evidence of institutional flexibility on the part of the settlers is not difficult to find. When they arrived in their new land, with a vastly lower person/land ratio than the one they left, most of them immediately changed their inheritance rules because the one they brought with them as part of their cultural baggage did not make sense in the new environment (Andrews). A century or so later they changed back to the old system. While this is tangential to the present paper, what it does indicate is that within the general constraints of their English cultural heritage, the colonists were capable of being quite supple, original, and perhaps even rational in choosing economic institutions for their new environment. Their use of agricultural commons can be cast in this light. Common fields, besides being culturally familiar, represented a rational institutional response to their new circumstances.

Accompanying the colonists to New England, especially in the 1630's, were relatively large numbers of domesticated livestock: cattle, horses, swine, sheep and goats. Given the situation that greeted them, it would have been extraordinary if they had tried to enclose their stock on individualized pasture areas. The quality of natural forage grasses available in the region

^{7/} Some debate is possible on this point.

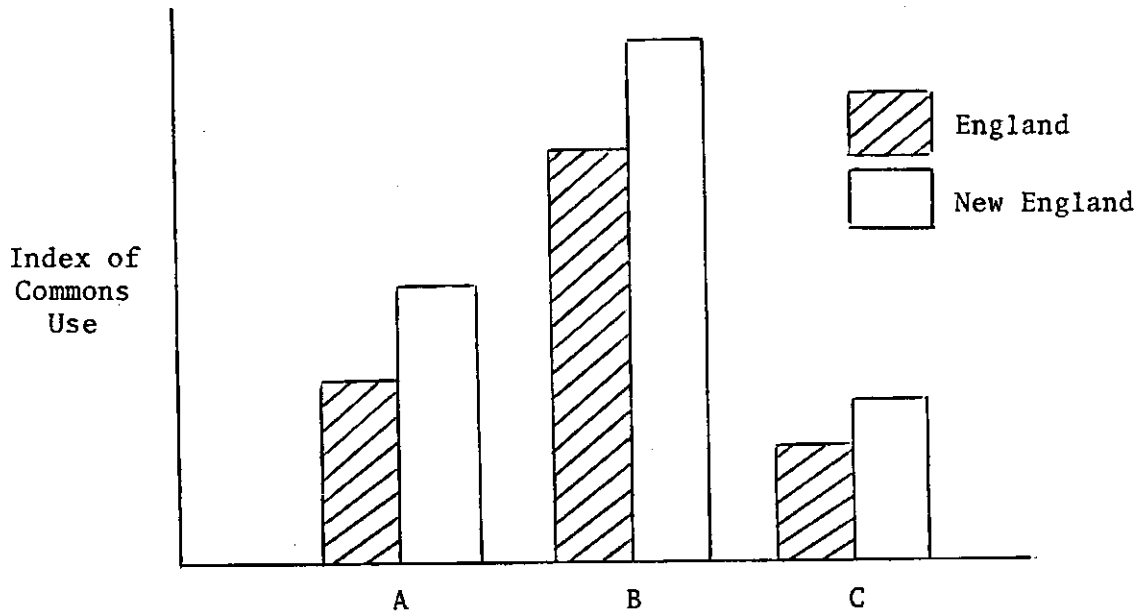
was low; in fact, many of the animals were expected to forage in the woods for whatever they could get (Bidwell and Falconer, pp. 19-20). With large amounts of pasture required per animal, and with a very high opportunity cost of labor for building fences, common herding was the institution of choice,^{8/} and would have been regardless of their cultural tradition.

Similar reasoning applies to tillage and meadow lands. The person/land ratio experienced by the settlers in the new world was much lower than the one they left in England. The relatively high initial cost of fencing, especially that of labor, led them away from trying to enclose all individual lots at the beginning. Still the crops had to be protected from wandering livestock. Common fences were the answer. The costs of this approach, in terms of difficulties in reaching joint decisions and of direct production externalities among individuals in a common field, were more than offset by the benefits, in terms of reductions in the costs of protecting crops from animals.

Of course, there were variations among communities in the extent to which common fields and grazing areas were used. To some extent these might be explained by variations in topography; we could expect the inland towns like Dedham, Massachusetts, to have quite different mixtures of cleared and wooded land than coastal towns like Ipswich, Massachusetts. But some of the variation is undoubtedly traceable to the cultural-capital that particular groups of settlers brought with them from open or closed field areas of England. What this approach fails to address are the "longitudinal" differences between the settlers' points of origin in England and their

^{8/} As it was for the Dutch settlers in the Hudson River area (Elfing).

new communities in New England, differences that stemmed from the vastly different labor/land ratio and the high initial costs of enclosing land in New England. Consider the following diagram.



On the ordinate is some index of the extent to which common property institutions are used in a given town. The exact nature of this index is irrelevant; we need it only to provide a way of conceptualizing the differences among communities. Along the abscissa are shown three New England towns, "A", "B" and "C". The rectangles above each town designation indicate the use of commons by each of the towns; most in town B, intermediate in A and least in C. The cross-hatched rectangles of each town register the extent to which common land institutions were used in the areas in England from which the settlers in each town originated. The non-hatched rectangles show commons use in New England. The ranking of these regions in terms of commons use in England is the same as the ranking of the three New England towns. But in

each case the New England towns used land more in common than did their English origin towns.

What the figure depicts is as follows. The move to new conditions in New England led the settlers to rely on common land-use institutions to a greater extent than they had in England; this held no matter from what part of England they came. But the interregional and intertown differences in commons use in England persisted in New England, and are brought to light when the first towns in New England are compared cross-sectionally. If one looks only at these cross-sectional differences, one is led to stress the cultural-capital model of institutional design, as in the recent work of Allen. Looked at the other way one is led to stress the influence of new-world conditions in leading the settlers to change their modes of agricultural production, by adopting quite new institutions or, as in this case, by combining known institutional forms in proportions different from those in their old world experience.

What has been lacking so far is a systematic comparison of agricultural practices in New England towns and old England towns of origin, with an eye to assessing the differences in height of the two rectangles for each town. The "cross-cultural" comparisons that have been done show basically that the intertown commons profiles were similar in the two countries.

If our thesis is correct, longitudinal analysis of this type should show, for example, settlers who came from enclosed field regions of England employing more land in common in New England than they did in England. A case of this perhaps is Watertown, Massachusetts. The first settlers in Watertown came from East Anglia, a fact which, Allen asserts, gave them a predisposition

toward enclosed, compact farms.^{9/} He thus concludes, in going through the Watertown records, that Watertown land grants "formed compact blocks", and that "no hint of common arable field regulations exists, except for the very earliest years when some direction was necessary to relieve confusion over grants" (Allen, p. 128). Our reading of the Watertown records leads us to quite different conclusions. There can be no doubt that common fields in Watertown were less organized, and more transitory, than in some other early towns. But there is plenty of evidence for common planting fields in early Watertown; in fact, town leaders struggled for many years with regulations pertaining to the fences around common planting fields (Watertown Records, First Book, pp. 1, 2, 3, 6; Second Book, pp. 15, 35, etc.). The last record we find of this is in 1680, over fifty years after first settlement of the town (Watertown Records, Second Book, p. 147). This history is not adequately characterized by "except for the very earliest years".

As for compact holdings, a quick glance at the early records of land holdings will indicate that there was a substantial amount of land scattering in early Watertown (Watertown Records, Volume I, Lands, Grants and Possessions).

Our conclusion is that use of agricultural lands in common is to be explained only partly by the notion of cultural capital. The reasons for the institutions are much more importantly related to its being an arrangement

^{9/} This shows some of the difficulties of the cultural-capital model for making fine distinctions; Young, in her book on early Salem, relies on the assumption that East Anglia was an area of open fields. East Anglia was a region of mixed institutional types (Postgate).

that made sense, in terms of economic efficiency, in the settlers' new environment.

IV. Managing the Commons

Economists have spent a great deal of time and energy on the conceptual and theoretical problems of using resources in common.^{10/} It is fair to say that, within this work, attention has been focused almost exclusively on the overuse question: too many cattle on the common pasture, too many boats on the fishery, too much pumping from the common aquifer, and so on. The colonists recognized the overuse problem, and consistently took steps to deal with it. But this was only one of the many difficulties they encountered in managing their commons. In fact, the use of this institution involved them in a rich and complex variety of managerial and public decision situations. We might categorize these in the following ways:

- (1) Preventing overuse, by actual and potential users
- (2) Enforcing individual contributions to improving the common fields
- (3) Coordinating the activities of different users
- (4) Adjusting to diversity among users
- (5) Determining how, and by whom, management rules could legally be enacted and enforced.

In the rest of this section we discuss some of the rules used in each of these categories by the early New England agricultural towns.

It has long been appreciated that, under open access conditions, a natural resource will be exploited at an inefficiently high level. This was

^{10/} cf: Dasgupta and Heal; Weitzman; Hartwick; Cornes and Sandler.

shown in the original open-access fishery model of Gordon; the reason for it being that individual fishermen do not take into account the external effects they inflict on others using the same resource. Dasgupta and Heal show that the extent of overuse may be lowered if the resource can be changed from strictly open access to common property;^{11/} that is, converted from a resource which may be used literally by anybody into one which is open to use only by a defined and limited group like the people who live within a certain community.

The early settlers seem to have known this, because they were diligent in limiting the size of the commons-using groups. They did this by trying to limit the use of their commons to those living within the community. This was not always possible, because in most new towns there were some land grants made to non-residents, and with these grants usually (though not always) went rights of commonage. Rules were frequent enjoining the sale out of the town of forest products produced on common lands; sometimes these prohibitions were absolute, in other cases they were conditional on getting approval of the town. A recurring problem for some towns, if we may take as evidence the existence of town laws against it, was citizens who brought animals from one town onto the commons of another.^{12/} This occurred, for example, when residents tried to rent their commonage rights to non-residents.

^{11/} This conclusion is disputed by Cornes and Sandler.

^{12/} "It is complained of that there are sheep taken out of other towns to be kept in our land that is feed in common much to the damage of the commons who have feed little enough to keep our own sheep. It is therefore ordered that if any such sheep be taken upon common feeding land...such persons as shall bring them into the town shall forfeit for every sheep taken 6d., half of it to the complainer and half to the town."
"Watertown Records, Book 2", page 99 (some spelling modernized).

Having addressed part of the commons problem by limiting the extent of the user group, the proprietors were then faced with managing access among themselves. The problem of managing access to a commonly-owned resource is essentially that of supplying a public good. It is a standard conclusion of most microeconomic models that in competitive market situations public goods will be undersupplied relative to efficient output levels' owing to the inability to exclude those who would free ride on the efforts of others to make them available. Among common users of a resource, acts of individual restraint are essentially public goods because they confer equal benefits on all users. Resource users can be expected to try and free ride on the restraint shown by others since this confers benefits without entailing costs.

The study of common property management from a conceptual viewpoint has led economists along three paths: voluntary, non-coercive types of strategies; public regulation; and privatization of the resource.

The search for voluntary, non-coercive solutions to common property problems has focused especially on trying to find voluntary solutions to the prisoners' dilemma of game theory. If this game is repeated, say once each growing season, resource users may undertake conditional strategies, e.g., adopt restricted-use levels if others used restricted-use strategies the previous year, otherwise adopt an open-access use rate. Under some circumstances it is possible to show that such conditional strategies will support efficient resource-use rates (see Taylor, Radner, Smale). The great problem with these approaches is that they do not deal adequately with the problems of attainability and sustainability of optimal use patterns, questions which loom large in the real world, where people differ greatly in their beliefs about the world and in their spirits of opportunism.

We might think that the Puritans, of all people, would find it possible to rely on voluntary, non-coercive approaches to the management of their common lands. Users of the common were, for the most part, members of a group which had already functioned more or less cohesively in establishing the community; they were often animated by a common religious afflatus that should have reinforced the ability to achieve voluntary economic coordination. We have a very transparent case where the different institutions of a community, in this case religious and economic, would interact with, and presumably reinforce, one another. Despite this, voluntary, non-coerced, use-limiting behavior was not a widespread feature of these early towns. There were some instances in which, in their very first years of life, communities allowed unconstrained access to the grazing commons, or forest products commons, by anyone who was granted a house lot and planting land in the town. Communities which began this way very soon changed to controlled access, however, though not always without strife. Most towns opted for coercion right from the beginning. They did this by granting commonage rights, each one of which entitled its owner to graze one animal unit on the specified commons each year. The number of commonage rights at first was tied quite closely to the quantities of planting and meadow land granted to an individual. Later this connection was not so close, so that a person might be granted a home lot, or some planting ground, without commonage rights.

Creating and granting unit rights to the common does not mean that they were enforced, however. The records are not very clear on this matter; they sometimes indicate the specific measures to be taken against those who misuse the commons, and occasionally show fines that have been levied against

violators. There was clearly a greater tendency to enforce grazing rules on commons closer to town, especially the corn fields that were opened to cattle after the grain was harvested, than on the remote and forested commons. We would also probably expect, a priori, that enforcement activity would be increased as the towns developed economically and livestock numbers increased, but the evidence we have on this is indirect, such as the number of times the issue surfaced in the ancient records of town meetings. Enforcement was no doubt abetted by the fact that farmers often herded jointly; that is, hired one individual to oversee a single composite animal herd. This person would be in a good position to know if individual farmers were staying within their commonage rights. Ear notching was also practiced to distinguish ownership.

Some towns adopted specific fines for people who placed more animals on the commons than they had rights. Fines were quite frequent for people who grazed animals on the wrong commons; for example, for grazing dry cows on the commons reserved for producing cows or pasturing sheep on cow commons. Our general conclusion is that access to the grazing commons was not controlled through reliance on voluntary stinting, but on direct methods of coercion carried out through the town political institutions.

Another problem of the commons was that of marshalling resources for improving these lands. Such improvements are public goods since they become available equally to everyone who has rights to the commons that are being improved. Grazing commons were frequently improved by cutting brush and trees or later by sowing improved varieties of grass. To marshal the labor for these tasks resort was often had to drafting the services of their citizens; for example, by requiring each adult to spend several days each year working

at improving the commons.^{13/} But the most vexing problem under this heading was managing the common fence enclosing planting field or meadow. The old town records are littered with regulations on this matter; in many towns the same regulation was re-enacted every few years, testifying to the continued difficulty the problem gave them.

The solution of choice to this problem, as evidenced by the fact that it was adopted in every town for which we have seen records, was to make each individual liable for building and keeping in repair a length of fence proportional to the number of acres he or she owned in the field being fenced.

This regulation came to involve fairly elaborate enforcement machinery. Most directly, penalties were necessary for those who did not maintain their portion of the fence.^{14/} It was common practice for towns to appoint fence viewers, whose task was to inspect fences and determine whether any portions were deficient, sometimes with payment only in the case that violations were actually found.^{15/} In some cases individuals had to place distinguishing marks on their portions of the common fence. Difficulties were frequently encountered with absentee landowners, or residents who for one reason or

^{13/} An Ipswich, Massachusetts law of 1656 stated, "...one able person out of every family shall work one day in May or June as they shall be ordered, to help clear the commons for the better keeping of sheep, upon a day's warning" (Ipswich Historical Society, p. 9).

^{14/} e.g., "...every person shall make up his fence, appertaining to any of the common fields, before the 15th day of March yearly, and so maintain the same sufficiently until all the corn be out; upon the forfeiture of six pence for every rod that shall be found defective..." (The Records of the Town of Cambridge, Massachusetts, 1630-1703, Vol. II, p. 81, (1648).)

^{15/} "...those men who were deputed to look after the fences shall have power to distrain for every rod of fence not lawful, half a bushel of corn, the one half to him that looks to the fence the other half to the town" (Hudson (Sudbury, 1641), p. 133).

another did not choose to cultivate their plots within the common fence. Regulations were frequently enacted giving exact physical specifications that fences were required to meet. Liability rules had to be worked out for complicated cases, such as when person one neglects to fence, allow person two's cattle to stray into the common field to devour person three's corn.

The fact that early farmers used common fields meant that they had to coordinate their activities to some extent. The greatest need for this came because common corn fields were opened to grazing after the grain was harvested in the fall. The opening of the fields to grazing had to be a joint decision, since anyone who had not harvested his corn by the designated time stood to lose his grain. Likewise, anyone who tried to plant his own plot before the common field was closed in the spring would probably have to replant because of livestock damage. The method for closing and opening fields was simply to establish, in meetings of the proprietors of each field, the particular calendar dates when these were to be done.^{16/} Of course, the closing had to be enforced by the appropriate fencing regulations, as discussed above.

In simple models of common property resources, individuals using the commons are often treated as being identical. In the so-called real world, however, nothing is so ubiquitous as differences among individuals regarding past and prospective economic objectives and capabilities. Differences in the abilities of individual fishermen is the major phenomenon used by Johnson and

^{16/} "Whereas the Indian corn does not ripen this year as formerly. It was therefore voted that for the present year the general fields of the town should be kept up entire for the keeping of said fields until the tenth day of October next..." (quoted in Burt (Springfield, 1691), p. 203).

Libecap in explaining reactions to public policies in the Texas shrimp fishery. The historical record of agricultural commons management shows also that differences among farmers, especially the growth of these differences through time, created major management difficulties; this factor was probably the most important impetus to privatization rather than simply overuse, *per se*.

One difficulty was the formulas used for allocating commonage rights. These were established as of a given point of time and were expected to hold for some indeterminate time into the future. But as time passed, the relative economic status of the settlers changed; some ceased farming to go into trades, some farmers prospered while others did not, and so on. One result of this in many towns was to generate great political pressure for a change in the rules for granting rights of commonage. The best known case of this was in Sudbury, Massachusetts, where the controversy it produced essentially tore the town apart, with a large group moving out to start another town.

But the most widespread procedure for adjusting to individual differences was to have markets in commonage rights. There is abundant evidence in the town records and histories that commons rights were bought and sold with great regularity.^{17/} Information is quite fragmentary on prices at which they traded. Allen notes that "gates", a right to graze one animal on the common, were trading at 3 shillings each in 1662 in Rowley, Massachusetts (Allen, p. 37). In Gloucester, Massachusetts, commonage rights were apparently selling

^{17/} For example, Sheldon (Deerfield), pp. 769 ff.; Babson (Gloucester), p. 233; Lord (Marblehead), p. 41; Phalen (Acton), p. 8; Brooks and Usher (Medford), p. 58; Currier (Newbury), p. 94; Manchester (town records), p. 64; Hudson (Sudbury), p. 107.

at about 30 shillings in 1697 (Babson, p. 223). Some attempts were made to institute price controls in these markets.^{18/}

The market in commonage rights was complicated by the presence of uncertainty about the future balance between private and common property. Konig (p. 52) reports the result of a case in Rowley in which one farmer sued another over rights to future division of the commons. One had purchased from the other some grazing rights on the commons for ten shillings each in 1664. But when the town decided to distribute some of the undivided land in proportion to one's holding of grazing rights, these rights obviously became more valuable; in this case they apparently increased in value to something over 20 pounds. This provoked a dispute between the two farmers over whether the purchaser of the grazing rights also owned the rights to new land in the division of the commons. He did, and this started a judicial precedent to the effect that those who purchased grazing rights had the right also to share in future land divisions.

One of the most interesting facets of the history of early New England land institutions is the evolution, and eventual demise, of a unique organizational structure to handle the special land allocation issues of the time. After the first land grants to individuals were made, there existed essentially three types of land: (1) privately owned and privately cultivated

^{18/} "...it is agreed that every man that has more than twelve great cattle or eight sheep or goats for every cow or horse that they must hire commonage of others is to be at 12 d. a year for a beast and not more." Cited in Banks (Edgartown), p. 35. This regulation was buttressed by a following regulation to the effect that if anyone did not buy sufficient commonage from others to cover their overstock, they were to pay the town 1 shilling and six pence, the six pence going to the town, and the shilling going to those who had a surplus of commonage rights.

land (e.g., house lots); (2) privately owned but commonly cultivated land (e.g., planting fields, some pasture areas), and (3) land not yet granted to individuals, the so-called "undivided" land, which was used in common by all, or a portion, of the town's residents. Land in the first category gave little problem; it was quickly fenced in to become a matter for strictly private decision making. Common fields, on the other hand, required joint decisions among those who owned land therein on who had rights of access. When the towns were first established the residents of the town and the users of land in common were essentially the same people. Thus, the standard political institutions -- town meeting, selectmen, etc. -- could be used to make decisions about the common and undivided land. This did not last long, however.

In most towns there soon appeared numbers of residents who did not have large land grants or commonage rights. These were people who perhaps did not intend to become farmers or people who were granted some planting ground but no pasture rights, and so on. The rate at which this group grew depended on the rate of immigration into the community and on how liberal the existing residents were in granting land-use rights to newcomers. But the influx of new residents and their participation in town affairs threatened to dilute the ownership and power of the landowning group vis-a-vis the common and undivided lands. Until the time that common and undivided lands finally disappeared, usually in the 18th Century, one of the major sources of political drama in the towns was the conflict between those who owned or controlled the agricultural land and those who did not.

There were two tasks confronting the landed groups: to manage the common fields; that is, those fields which were actually comprised of individual

plots but were cultivated to some extent in common; and to manage the undivided lands, those areas that had not yet been granted to individuals. The institutional means for doing these jobs was the "proprietors of the common and undivided lands", a group, or groups, which tended through time to become increasingly distinct from the other town political and religious institutions.

The proprietors of each common field consisted of those who held tracts in that field. Joint action was required in two main ways, as we have mentioned above: seeing to the common fence and adjusting their cultivation practices to one another. Our expectations might be that they relied heavily on voluntary, non-coerced, methods of decision making in managing these fields. This belief might reasonably flow from our understanding of the settlers' common backgrounds, common religion, common economic objectives, and so on. Buttressing this would be our received myths about the extent to which early settlers are supposed to have been dominated by thoughts of community and maintaining their positions in a "densely woven network of religious and kinship ties". As in the case of common grazing, however, this expectation would be largely contradicted by the evidence. The proprietors, as an institution, very shortly became legally recognized bodies with powers to tax themselves, set and enforce regulations, and protect themselves against trespassers. They gained control, also, of the water rights on their common fields.

In Massachusetts these powers were acquired over time through actions of the General Court. In 1647 this body established the legality of proprietors' groups and set terms for their decisions:

"It is ordered, that in all common fields of meadow and pasture, wherein there are several proprietors fenced in by one common fence, made by the several proprietors, in all those fields the proprietors of the greatest part of the land in such fields shall have power to order and appoint the improvement of the whole field, save of such proprietors of land as shall be sufficiently fenced by itself, which any such proprietor may lawfully do" (Records of the Colony of New England, Volume II, p. 195).

It is notable that this regulation defined legal action as anything undertaken by those owning a majority of the land in the common field, not by a simple numerical majority of the proprietors themselves. It is also noteworthy in that it permitted an individual to enclose his or her own land without approval by the other proprietors. This was quite unlike the practice in England, where individuals could enclose only after working through a much more complicated and costly political scenario.

The proprietors also had control over undivided lands, lands that had not yet been granted to individuals. This right was legally recognized after numerous struggles on the local level among proprietors and other members of the communities. Population growth in many early towns led to demands by non-proprietors for access to these undivided lands, for house lots, for pasturage, wood, etc. It also led to demands for entry into the proprietor groups, since they obviously stood to gain in future divisions of the commons.

These demands could not be resisted in total. In some cases new demands on the commons could be beaten back through town regulations or special acts of the state legislature, but in most cases each new challenge led to some widening of the group of proprietors. A frequent result was that proprietor groups were enlarged to admit the immediate group of outsiders who were agitating for admission, but with rules specifying that future new commoners

would not be admitted. Thus, proprietors groups were often enlarged, in fits and starts, through political action. In a few cases control of the commons was wrested from the proprietors altogether. In Salem, Massachusetts, for example, continuing political strife between landowners and would-be landowners led eventually to a complete victory for the latter; in 1702 the remaining undivided land, amounting to something over 4,000 acres, was divided up among 1,132 claimants (Maclear, pp. 103-104).

V. The Transition to Individual Property

To the best of our knowledge there are no common fields in New England at the present time. The last evidence of their use refers to Cape Cod in the latter part of the 19th Century (Adams, p. 35). While there is plenty of publicly-owned land today — village greens, areas around reservoirs, community gardens, conservation areas, public parks, etc., there are no agricultural fields used in common by groups of farmers for their own profit. The agricultural sector has made the transition to individual private property.

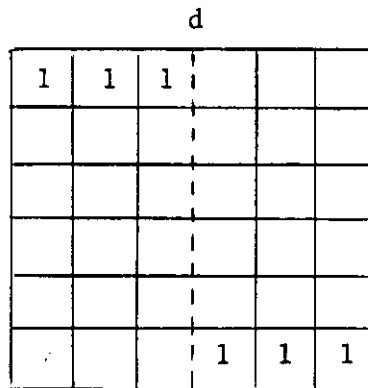
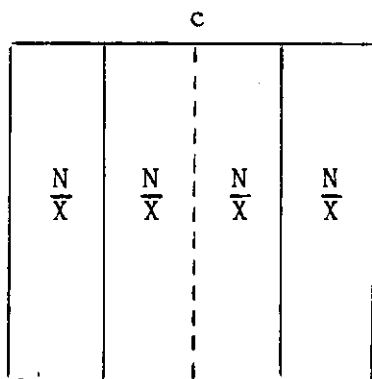
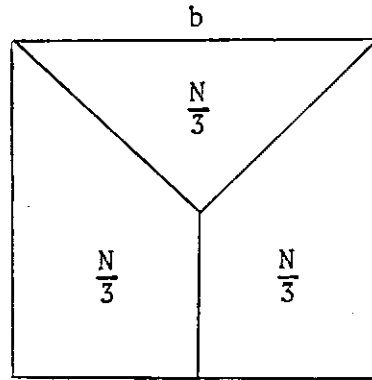
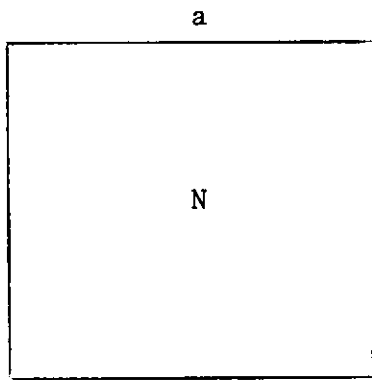
Economic studies of changes in property rights systems have been hampered by use of ideal types. We have typically identified two discrete property rights regimes: common property and private property. The implication is that we must switch from one system to the other with some type of quantum institutional leap. In fact it is a solid part of received wisdom that the history of western civilization involved a jump from the more primitive system of common property to the more advanced and productive system of private property. Private property is clearly seen as the superior institutional form that supplanted common property and made economic growth possible.

The history of agricultural land institutions in New England as we interpret it, disputes both parts of this nation. We have discussed earlier our contention that the settlers initially used land more in common in New England than they did in old England. That argument was based on theory and not on direct empirical evidence, however. The other part, on which we do have evidence, is that the shift to private property was more gradual than implied by standard economic models. It made use of transitional forms that combined elements of common and private property. Of course, the transition went at different speeds in different communities; they started at different places on the institutional spectrum, they occupied areas with different ecological characteristics, they were subject to different pressures from population immigration, and so on. Nevertheless, the transition was evident even in towns which change relatively quickly.

The transition consisted, essentially, of dividing the original commons into smaller and smaller areas to be used in common by smaller and smaller groups of farmers. If this procedure is followed long enough, eventually one arrives at private property. We can sketch this process in the following way. We start with a land area composed of A acres, and a total of N farmers. This could be the entire town, or some portion of the town used as a particular commons. For convenience, we rule out any reduction in the number of farmers. One possibility is for all N farmers to use all the land in common. This is depicted in part a of Figure 1, where we show simply a square of land used in common by N people. Another possibility is to divide up the area in N tracts. Then each tract would be operated by only one farmer. This is depicted in part d of the Figure, where the individual tracts are shown as roughly equal in size.

Figure 1

Alternative Property Rights Arrangements



These two extremes correspond to the two ideal types: common property and private property. In fact, however, these represent only the end points of a continuum of property-rights institutions. In parts b and c of Figure 1, we have depicted two of the many intermediate types. Part b shows a situation in which the area has been divided into three tracts, and each tract is used, in common, by $N/3$ farmers. Part c shows the area divided into X tracts, with each tract being operated in common by N/X farmers. Since X can take on any integer value from 1 to N , we have $N-2$ possible intermediate property rights situations.^{19/} Each intermediate form consists of a mixture of common and private property. Each area is owned privately by a subset of the N farmers, but used in common by them.

The various boundaries need not be enforced uniformly. One possibility is to enforce boundaries around designated groups of individual plots, but enforce to a lesser extent the boundaries between users within each group. This is the historical English (and colonial American) "open field" institution.

Forming the problem in this way leads to some obvious questions. What point on the continuum is optimal for a given set of farmers and land area? Is it possible for an intermediate point to be optimal or would we expect the ends to dominate in most circumstances? Assume that land institutions currently in use involve a particular value for X , the number of commons areas into which the total acreage is divided. A move in either direction, i.e., increasing or decreasing X , has three primary impacts on costs and outputs:

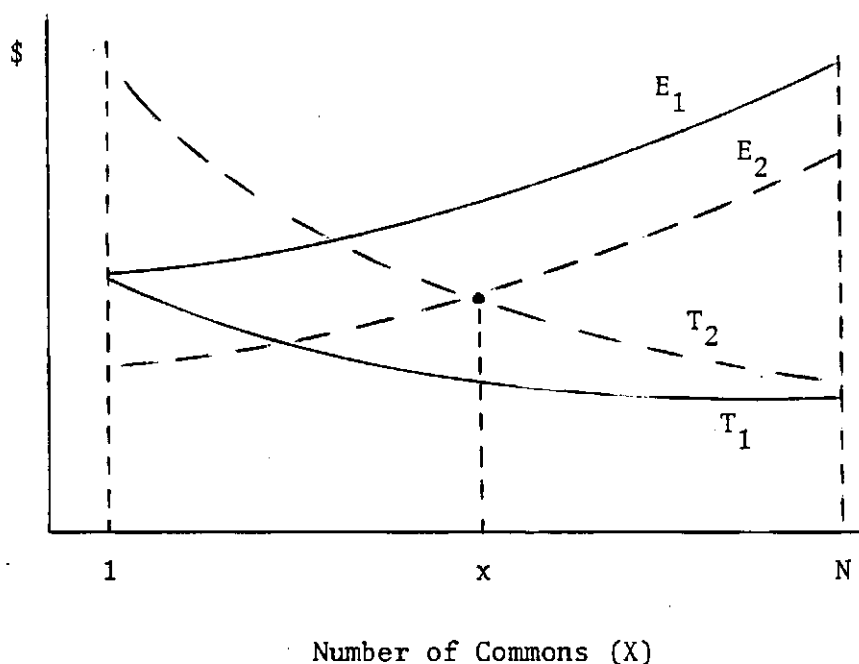
^{19/} If one were still addicted to dichotomous classification, one could define common property as anything with more than one owner. But this does not give a very rich institutional repertoire with which to work.

- (1) A change in resources devoted to defining and enforcing private rights. This includes such things as fencing costs, legal costs to determine title, costs of detecting and stopping encroachments, and so on.
- (2) Changes in externalities of the type that characterize common property, effects that result from congestion and overuse.
- (3) Changes in size of the subgroups who are using, in common, the designated subdivisions of land. This is important for several reasons. In models of common property, such as that of Dasgupta and Heal, the extent to which the commons is used in excess of the value-maximizing level depends on the number of users who are allowed access to the resource. The smaller this number, the less the overuse, even with no controls on use by individual members of the group. Thus the larger number of commons areas into which the total land area is divided the lower the overuse in each area, and therefore the lower the aggregate overuse. As X approaches N , the overuse approaches zero. A second reason why changes in the number of people using a common area is important is that voluntary, conditional-strategy type agreements may be more feasible as this number decreases.

Let us reduce these three items to two: (1) exclusion costs, or the costs of excluding those not "entitled" to use a particular common area, and (2) transactions costs, or the costs that a commons-using group experiences when it uses the resource at an optimal level; these may be decision costs as well as residual external costs the users inflict on one another. These two costs vary in opposite directions with the number of commons specified, " X " in

the example above. We depict this in Figure 2. Curve E_1 are the marginal exclusion costs and T_1 the marginal transactions costs, applicable to the first years of the colonial towns. At this time marginal costs of defining and enforcing land rights, especially fencing costs, were high. The marginal transactions costs of making group decisions were relatively low, and external costs were relatively modest because there was a substantial degree of homogeneity in the cultivation practices and objectives of the settlers. Thus the optimal number of commons in this case was one.

Figure 2
Optimal Commons



But with time these factors changed. Fencing costs decreased because of reductions in labor prices. Heterogeneity among farmers increased, leading to rising transactions costs among commons-using groups. Thus the functions shift through time, for example E_2 and T_2 ; making x the optimal number of

commons. In time, of course, the optimal number of "commons" went to N, i.e., complete private property.

An example of this progression toward private property can be seen in the records of regulations pertaining to the common herd(s) in Watertown, Massachusetts. The first regulation, in 1636, stated simply that if any oxen or steers were found among the milk cows, they could be impounded and their owner fined 5 s. per animal per violation.^{20/} By 1648 the situation must have been getting more complex, as there was an attempt to organize to some degree the matter of grazing:

"ordered that all cattle (except calves of this year) shall not go upon the common or highways without a sufficient keeper, after the first of May next..."^{21/}

The effect of this was probably to cause the farmers to move toward joint herding, since the individual costs of cattle keepers could have been lowered by so doing.

This state of affairs lasted for about twenty years, at which time rising external effects among farmers led them to divide the town into three separate herds:

"The selectmen, being informed and complained unto that the inhabitants are not able to come to any orderly way for the herding of their cattle, by reason that many prefer to keep their cattle with private keepers, others drive their cattle sometimes over the water at the mill and elsewhere, others turn their cattle loose, knowing they will feed up Cambridge bounds, to the just offense of our neighbors whose love and respect we much pride, others that lie near the feed are not willing to herd nor pay any herdsman, and others, though willing to herd with the neighbors

^{20/} Watertown Records, Volume 1, p. 3.

^{21/} Ibid., p. 17 (spelling and punctuation modernized).

for some time but not willing to pay for the whole time...it is ordered: That there shall be but three herds in the town, the first shall be the Mill herd, which shall take all the cattle from William Bond's house...to Richard Cutting's...", etc.^{22/}

This apparently did not get it quite right, because the next year it was:

"...ordered that there shall be kept in Watertown four herds...and that they should be ordered as follows..."^{23/}

What these regulations illustrate is a move along the common-private continuum, such that pasturage becomes increasingly private. Of course, evidence in the public record on this move becomes progressively scarce. When we get to the point where a common pasture is common to only two or three farmers, conflicts among them become a matter of private record in the courts, rather than a matter to be dealt with in town meetings. Eventually, however, if the cost factors affecting the optimal common/private mix continue to change, all land ownership is in the form of individual enclosures.

It is extremely difficult, of course, to find evidence on the exact magnitudes of the cost items that determine the size of the optimal commons. In those days, for example, fence construction was essentially all labor requirements, the opportunity cost of which was time taken away from other tasks. As the population and labor force grew, these costs had to come down, though we do not know how fast.

More important than fencing costs, perhaps, were transactions costs of making group decisions on the commons. With time, agriculture became more heterogeneous; new crops were undertaken by some farmers, farmers adopted different cultivation techniques, variations in the size of land holdings

^{22/} Watertown Records, Volume 1, p. 94 (spelling modernized).

^{23/} Ibid., p. 98.

probably increased, some degree of specialization was probably adopted, etc. These developments increased the external effects among farmers operating a common field and increased the transactions costs of agreeing on common courses of action. Some appreciation of this can be had by looking at a series of common-field laws enacted in Watertown over a period of about twenty years.^{24/}

February 1635. "Agreed by the freemen that whosoever has a lot in a general enclosure shall fence it with the rest according to proportion, and if he shall refuse, the lot shall return to the Town again." Watertown Records, Volume 1, p. 1) (Spelling in this and subsequent passages has been modernized).

September 1635. "Agreed that there shall be sufficient fences kept in winter as well as in summer in all general enclosures where English grain is sown to the preservation thereof, and whosoever is faulty after 3 days warning shall pay 10 s. to the use of the Town." (Watertown Records, Volume 1, p. 2)

December 1637. "Ordered that about every common field there shall be sufficient fence made up against the 1st of April next by every person having ground in the said field proportionately upon every acre, and for default hereof he shall pay 4 s. for every rod unfenced within 6 days after to the Town." (Watertown Records, Volume 1, p. 3)

March 1640. "Ordered that the Hither Plain being subdivided into several lots for plowground shall be made a common field, and therefore every person that has a lot there shall according to his proportion of acres make a sufficient fence...by the 10th of May next, and upon that condition Abram Browne surveyor for the Town shall measure out the land to them, otherwise the land is to return to the Town again according to the former order.... Nevertheless it shall be lawful for any person to fence in particular his own lot at his pleasure." (Watertown Records, Volume 1, p. 7)

^{24/} Not all such laws have been included, for the sake of brevity.

February 1647. "Memorandum: It is agreed between the commoners in Meed Field that John Lorraine, Timothy Hakings, John Brabrick, and Thomas Boydon and Sergant Bright, shall fence their upland and meadow in the field aforesaid in particular and the commoners upon the west side to close in their upland and meadow upon the aforesaid commons; provided that Thomas Boydon's meadow is not intended in the first particular but to be fenced with the commoners on the west side, viz: Mr. Brisco, Isa Steerns, John Fleming, Mr. Bowman, John Warrin, William Hamant, Mr. Busby, which are the west commoners intended, William Hamant's upland being not included in this order." (Watertown Records, Volume 2, p. 14)

January 1653. "...all general fields that have been enclosed by the mutual act of the commoners of fencing and planting together and have so continued the last year or more past, such fields so enclosed are accounted by the Town a general field, and the bounds of such fields to be in all places as by the aforesaid act of the commoners they were first enclosed and so to continue until the like act or something equivalent thereto be agreed upon by the commoners in reasonable time and fully declared or that any such commoner shall discharge himself by particular fencing according to order of the Court. And that every such commoner in such fields shall make such fence in proportion for all his planting land, meadow, or pasture land as shall hereafter be appointed, always provided that if any of the commoners shall give notice to the rest of the commoners 7 months before any summer grain is sown or planted that he will not improve his land no longer, that then the Town will not charge any delinquency for not fencing upon such commoner who shall cease to improve his land. But if he shall notwithstanding such notice improve his land he shall be liable as before and bear all charges he has put the field unto.

"...that in all general fields enclosed or continued by a verbal or written covenant or enclosed and continued by an implicit covenant as aforesaid, that the commoners in all and every such field shall forthwith take care if not already done timely to lay out to every of the commoners in their respective fields the portion and place of fencing by the first of March next ensuing upon the penalty of 20 s. and 5 added for every day neglect after the said first of March to be levied for the use of the Town upon any of the estates of the commoner in any field that shall so neglect." (Watertown Records, Volume 2, pp. 35-36)

The Watertown authorities continued to deal with common field problems into the 18th Century,^{25/} but the orders became increasingly individualized through time, directed at specific individuals or small groups. Ultimately, as the number of farmers using any particular field decreased, common field behavior became a matter of common law and public efforts to control behavior on the commons died out.

One reason, perhaps, for getting the impression that the shift from common to private property was very discrete and abrupt, is that the town records show large chunks of undivided land being divided among and granted to individuals at particular points in time. It is natural to think of these specific episodes as the times when property changed from common to private. But the de facto transition was much more gradual. The reason for this is that common access to land is not ruled out by putting it into private ownership. The case of Northampton, Massachusetts is a good illustration of this. The town was established in 1653, with grants of house lots, meadow and upland. In 1663 much of the remaining commonly owned land was granted to individuals. The rest was granted in 1684, and several times after this there was a substantial amount of regranting because landowners complained of excessive scattering among their plots. In all of this, however, the general public retained the right of commonage (timber, wood, stone, and grazing) on these lands, as long as it was not fenced. In 1742 the landowners finally tried to extinguish the commonage rights on "their" land. Some were extinguished, but at the price of an agreement continuing commonage rights to a large portion of the land for ten more years. In 1752 the matter came up

^{25/} See Watertown Records; Volume 2, p. 87, p. 147.

again. Those who wanted to retain commonage rights on this "private land" were able to postpone the end for another 10 years. Finally, about a century after the land was granted to individuals, rights of commonage were extinguished. Of course by this time a substantial proportion of the land had been enclosed by individuals. Nevertheless the case illustrates ways in which a transition from one set of property rights to another, which would seem to require a discrete jump at some point in time, can be turned into a process of gradual adjustment.

VI. Summary

Common use of land was a widespread institution in early New England agriculture. In some communities it persisted for over a century after their founding in the 17th Century. Historians have explained the institution by noting that it was part of the settlers cultural and institutional experience they brought from England. We have argued here that it can better be understood as a rational institutional choice by the settlers in the new environment in which they found themselves.

Individual use levels of the commons were not left to be decided by strictly voluntary means, but were the subject of close regulation by the settlers acting together. Regulations to prevent overuse were widely adopted and were quite sophisticated in many cases. Markets in commonage rights were active. The biggest management problems were enforcing contributions to improving the commons (e.g., fencing) and adapting usage rules to the heterogeneity that developed among farmers.

The evolution from commons to private property was relatively gradual. It consisted, essentially, of dividing larger commons into smaller commons,

under the influence of two major cost items, the cost of excluding others from using a common resource, and the internal transactions and productivity costs among users of any commons. The historical record gives the impression that the transition from common to individual property was more abrupt than it was in fact. One reason for this is that as commons get smaller they cease to be a matter for public policy and become situations for bargaining among small groups of individuals; thus they tend to disappear from the public record. Additionally, property use is not always in accord with apparent property rights as they appear in the record. In most towns land continued to be used in common long after it was divided up into individual tracts; what led to the end of common use was the falling relative cost of exclusion.

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