Essays in Exploration

Property Rights in Economic History: Implications for Research

GARY D. LIBECAP*

Economics Department and Karl Eller Center, University of Arizona

That which is common to all is proper to none.

Thomas Hutchison

I. INTRODUCTION

Property rights institutions underlie the performance and income distribution in all economies. By defining the parameters for the use of scarce resources and assigning the associated rewards and costs, the prevailing system of property rights establishes incentives and time horizons for investment, production, and exchange. Since property rights define the behavioral norms for the assignment and use of resources, it is possible to predict how differences in property rights affect economic activity. That linkage is critical in research in economic history for understanding variations in growth and welfare across societies and time.

The comparative statics of assessing the impact of property rights institutions on economic performance are complicated because causality also runs in the opposite direction. Competitive forces tend to erode institutions that no longer support economic growth. Changing market conditions exert pressure for dynamic adjustments in the existing rights structure through refinement of rights and privileges or their transfer to others (voluntarily or through coercion) to facilitate responses to new economic opportunities. Predictions regarding the way in which property rights arrangements respond over time to changing economic opportunities, however, must carefully consider political or equity factors. Distributional conflicts arise when property rights are coercively redistributed by the

* The author has benefitted from careful reading and comments by Don McCloskey, Robert Higgs, Barbara Sands, Ian Wills, and three referees.

1 Quoted in Hughes (1976, p. 34).
state, with little or no compensation. State intervention is possible at the behest of interest groups if voluntary exchange breaks down due to a host of potential bargaining problems (limited or asymmetric information, for example), or if there are major differences in political power among the parties that encourage the circumventing of market transactions in favor of a political redistribution. In either case, disadvantaged parties will oppose the new arrangement, even though it allows for an aggregate expansion in production and wealth. Accordingly, analysis of the likely winners and losers of economic and institutional change and their interaction in the political arena in specific settings is necessary before the observed pattern of property rights can be understood.

Despite their importance, property rights often have been ignored in studies of economic growth. They are assumed as given or merely a reflection of overriding economic and political forces and hence not deserving of analytical attention. Yet property rights are the basis for individual rational choice, which is the core of the neoclassical economic theory employed in much of the recent research in economic history. As such, they deserve careful attention. Indeed, without explicit recognition of the role of property rights in setting the environment for economic activities, differences in economic performance cannot be evaluated.

While research on property rights has many intellectual bases (notably, Commons, 1924) the literature discussed in this paper builds largely on the work of Coase (1937, 1960). In particular, his 1960 paper made economists and economic historians more aware of the role of property rights and transactions costs in molding economic outcomes. Transactions costs include the costs of bargaining, information, measurement, supervision, enforcement, and political action, and they help to determine how individuals respond to changing economic conditions. When transactions costs are low, the initial assignment of property rights does not matter, according to Coase, because rights can be voluntarily adjusted and exchanged to promote increased production. Where transactions costs are high, as is often the case, the allocation of property rights is more critical, since transfers are less fluid. In those circumstances, the existing property rights arrangement has profound and enduring effects on production and distribution. A sampling of the literature that extends the work of Coase includes Alchian and Demsetz (1972), Alston and Higgs (1982), Hoffman and Spitzer (1982), Klein et al. (1978), Wallis and North (1986), Wiggins and Libecap (1985), and Williamson (1979).

The interaction among property rights, transactions costs, and economic and political forces has been emphasized by Field (1981) in his criticism of North and Thomas (1973). He argues that this interdependence frustrates the development of models of endogeneous institutional change. His comment underscores the empirical and theoretical complications in property rights research. The challenges involved are repeated in a variety
of settings in economic history as outlined below. This paper is not an exhaustive survey, and hence much otherwise deserving research will not be mentioned. Rather, the aim is to highlight certain areas where progress has been made in understanding institutional forms and to draw implications for future research.

The following section outlines theoretical arguments regarding the interaction between property rights and economic and political behavior. Section III surveys three research areas: property rights to natural resources in the American West; Parliamentary enclosure of open fields in 18th century England; and land tenure arrangements in the American South. Section IV provides more detail on property rights and the political economy of crude oil production regulation in the United States from 1920 through 1972. Finally, Section V outlines implications for future research in economic history.

II. PROPERTY RIGHTS: ANALYTICAL CONCEPTS

A. Efficiency Implications

Property rights affect economic behavior through incentives. They delineate decision-making authority over economic resources, determine time horizons, specify permitted asset uses, define transferability, and direct the assignment of net benefits. Because they define the costs and rewards of decision making, property rights establish the parameters under which decisions are made regarding resource use. Discussions of the fundamental role of property rights in economic behavior are provided by Alchian and Demsetz (1973), De Alessi (1980), Demsetz (1967, 1972), Furubotn and Pejovich (1972), Furubotn (1985), and North (1981).

The delegation of legally sanctioned use privileges for economic resources and the corresponding assignment of costs and benefits for consideration in decision making are key roles played by property rights in an economy. In the limit, if property rights are so completely defined and enforced that private and social net benefits are equalized, there will be no externalities. Economic decisions made in circumstances where all social costs and benefits are considered will maximize total wealth, given the existing income distribution and market demand composition. An alternative, though complete property rights assignment, will have a correspondingly different income distribution, demand structure, and production mix. Nevertheless, the output chosen will maximize aggregate wealth under the new rights distribution. In a general efficiency sense, the key is the completeness of the definition of property rights and not the specific allocation.

The efficiency gains from well-defined property rights are illustrated by the common pool problem. The classic discussions by Gordon (1954) and Cheung (1970) examine open-access fisheries. The implications of their arguments, however, may be generalized for other resources and
economic settings, and hence should not be viewed as merely relevant for natural resource issues.

Following Gordon, one sees that with no controls on entry and use, individuals are attracted to valuable resources so long as private marginal costs are equal to or less than the average returns from resource use. In those circumstances, resource values and incomes fall for a number of reasons. First, because property rights are not assigned to the resource, individuals do not take into account the costs they impose on others by their activities. Because some social costs of resource use are ignored, excessive use is encouraged and private and social net returns diverge. Total production by all parties exceeds the wealth-maximization point where social marginal costs equal social marginal returns. Second, by equating only the relevant private marginal benefits and costs, individuals under open-access conditions exploit the resource too rapidly relative to interest rate and price projections. User costs are ignored; short time horizons dominate, and long-term investment is neglected. With open entry, investors cannot be sure that they will capture the returns from any investment. Third, without exclusive rights, exchange and reallocation of resources to higher-valued uses are extremely difficult. Indeed, with the uncertain control associated with open access, productive labor and capital resources must be diverted to predatory or defensive activities and output falls. In the limit, under common pool conditions, the aggregate effect of individual decisions can dissipate the full value of the resource.

In the empirical case of open-access fisheries, intensive competition for rents leads to economic and biological overfishing. Fish stocks are rapidly depleted; catch and income per unit of effort fall, and aggregate labor and capital costs are driven up (Higgs, 1982; Johnson and Libecap, 1982). These factors account for the precarious condition of most of the world’s great fisheries. Similarly, with other natural resources, such as agricultural land, timber, oil, and minerals, common property conditions result in wasteful uses that reduce the net contribution of the resources to social welfare.

Open-access characteristics exist by degree in other settings where property rights are not fully defined over the various margins of production. In practice, property rights will rarely be complete, in part because of the costs of defining and enforcing property rights, through both private and public means. From a social wealth-maximization point of view, the precision of the rights structure depends on the balance of the expected social gains and the costs of negotiation, measurement, and enforcement. Since net costs vary across resources, depending upon their expected value, physical characteristics and distribution implications, property rights will vary. For example, measurement and enforcement costs are high for migratory resources like air, water, and fisheries. Recognition of these costs prompted Coase (1960, p. 39) to assert: “But the reason
why some activities are not the subject of contracts is exactly the same as the reason why some contracts are commonly unsatisfactory—it would cost too much to put the matter right.” Beyond these broad social precepts, the nature of the property rights arrangement observed in a society at any time depends upon the political economy of assignment and enforcement, as outlined in the following section.

B. Contracting for Property Rights and the Dynamics of Institutional Change

Other things equal, property rights tend to be made more precise as resource values rise. An increase in value attracts additional claimants, raising the losses of common pool situations and increasing the returns from contracting to define rights. Demsetz (1967), for instance, describes the development of property rights among the Montagnes Indians of Quebec with the coming of the fur trade and the corresponding increase in value of fur-bearing animals. Similarly, Libecap (1978a), and Umbeck (1977a) outline negotiations to define mineral rights on previously unclaimed land, following the discovery of rich gold and silver deposits after 1848 in the American West. By the same logic, a decline in contracting and enforcement costs, ceteris paribus, will bring a more complete rights structure. For example, Anderson and Hill (1975) link the introduction of new technology, barbed wire, to the improved enforcement of property rights to land and livestock in the 19th century.

Changes in property rights in response to shifts in the net private benefits of contracting are described by Davis and North (1971). They view property rights institutions as the outcome of rational decision-making, investment processes, where rights are established in stages as individuals seek to respond to new economic opportunities. The contracting underlying property rights that they describe involves both private and governmental arrangements. The role of the state in establishing rights and regulating economic activity is further discussed by Goldberg (1976) and Williamson (1976). They outline cases where bargaining issues are so complex that private agreements break down, providing possible justification for governmental intervention through regulation to complete and enforce contracts at the insistence of the bargaining parties. The organization of interest groups and lobby efforts to mobilize government in their behalf are described by Buchanan and Tullock (1962) and Olson (1965).

Similar, though more empirical, arguments regarding the role of the state in establishing property rights and reducing transactions costs for exchange are made by Hurst (1960, 1964) and Scheiber (1973, 1975). Hurst outlines the role of the Wisconsin legislature and courts in assisting the growth of the lumber industry. Scheiber describes the use of eminent
domain law and other regulatory provisions by state governments in the 19th century to mobilize resources for economic growth.

Despite these optimistic views of governmental intervention in support of increased production, the role of government in property rights definition is more complex, and predictions about the outcome must be made cautiously. There are multiple claimants for property rights vitally interested in the resource uses and income distribution associated with them. The relative strengths of competing groups in the political arena importantly influence how property rights are defined and allocated at any time, and the institutions that emerge are unlikely to correspond to a hypothetical wealth-maximizing norm.

By definition, the assignment of property rights necessarily excludes nonowners from access to valuable assets, and government regulation attenuates the property rights held by others. Accordingly, government policies are controversial, with both political benefits and costs to politicians from assigning, adjusting, and regulating property rights. Those negatively affected protest and demand compensation. Side payments are a theoretical possibility, and in practice they occur in some forms, but they rarely are a solution to distributional conflicts. Agreement is difficult on the amount of compensation to be paid, who should pay it, and who should receive it. Generally, then, there are equity effects from the assignment of property rights, and the resulting distributional implications and political benefits and costs to politicians determine government policy with respect to the rights structure.

The political economy of institutional change has been examined in a number of different ways. One is from the viewpoint of the development of the law, as described by Friedman (1973), Hughes (1977). Hurst (1960, 1964), and Scheiber (1981). Friedman and Hughes emphasize the role of powerful economic interest groups in influencing judicial rulings, statutes, and regulatory policies. Hughes notes that the results often make sense as history, law, and sociology, even though they make no sense as economics, narrowly defined. Scheiber calls for a reevaluation (including his earlier writing) of the view of law as a means of expediting economic development, since it also has been used to constrain development. He points to the need for detailed studies of individual state legal systems to identify the winners and losers "when the law was used to allocate advantages and liabilities" (1981, p. 108). Only through such analyses, according to Scheiber, will the law and its impact on the economy be understood.

A second avenue for analysis of the political economy of property rights has been through discussions of the political process and the appropriateness of economic theory in analyzing it (Anderson and Hill, 1980, 1983; Reid, 1977a). Anderson and Hill (1983) argue that competition for property rights in a political setting and the methods by which rights
PROPERTY RIGHTS

...are defined can result in socially costly rent dissipation. Reid is critical of standard neoclassical tools for examining political events, such as regulation and the assignment of property rights. He argues that the assumptions that underlie the analysis of product markets may not apply to political markets and hence, neoclassical theory may not correctly predict the timing and nature of political change. Reid emphasizes that economic efficiency cannot be presumed to dictate outcomes in political markets. Recognition of the political economy of contracting for property rights, then, is necessary for understanding the existing rights system and why many arrangements persist as seemingly perverse responses to common pool problems.

The assignment of property rights has been the focus of research in a number of specific settings. Higgs (1982), Johnson and Libecap (1982), McEvoy (1983), and McEvoy and Scheiber (1984), for example, examine fisheries. Johnson and Libecap analyze why most United States fisheries continue as common or open-access resources, despite long-standing recognition of the costs involved and repeated regulatory efforts to correct them. The regulatory responses implemented have been incomplete, with continuing rent dissipation. Moreover, they have been received with little enthusiasm by fishermen, the group that should benefit from controls. Private property rights are outlawed for most species in the United States, though enforcement costs might make them inappropriate in any event. Accordingly, various regulatory controls on entry and catch are the only available solutions. Fishermen, however, do not agree on the regulations that should be imposed. High contracting costs exist among fishermen who have differential skills, equipment, and incomes. Better fishermen who have adjusted to open-access conditions fear disproportionate constraints on their fishing by comprehensive regulatory schemes. As a result, consensus among fishermen and politicians can be reached only on a set of limited regulations that reduce the worst abuses of uncontrolled production.

Higgs examines the gradual outlawing in Washington state, since 1860, of cheaply enforceable property rights to the salmon fishery and the corresponding prohibiting of the most efficient production techniques. Since salmon are anadromous, they can be caught at low cost when they return from the ocean to spawn in fresh water streams. The early commercial fishery employed gill nets, traps, and fish wheels along rivers, and property rights to specific sites commanded high values. But in the 1930s, commercial fishermen using higher-cost techniques and sports fishermen lobbied the Washington legislature to exclude their low-cost competitors. Consequently, very productive traps and other fixed gear were outlawed, leaving only the interception of salmon at high cost in the open sea under licensing, gear, and season controls. Higgs suggests that under current property rules, the Washington salmon fishing has a
negative social net product. The peculiar response to a common pool problem documented by Higgs was the outcome of political competition among fishing groups for favorable property rights statutes, regulations, and court rulings.

The importance of relative political power in property rights outcomes is also revealed in other studies. As described in Section IIIB below, common fields in England in the 18th century were forcibly enclosed through Parliamentary Acts where private contracting costs for consolidation were high. While there were clear distributional effects, the landed gentry favoring enclosure was able to overcome political opposition. McCloskey (1972) argues that enclosures brought an increase in the value of agricultural output by facilitating new techniques and production for large-scale markets. Counterexamples where political pressure prevented increases in output, however, also exist. North and Thomas (1973) argue that opposition to new property rights allocations in France and Spain in the late Middle Ages is responsible, at least partially, for the apparent slower economic growth in those countries than in England and Holland. Similarly, Libecap and Wiggins (1985) show that political opposition to regulations for reducing common pool losses from small crude oil-producing firms, which benefited from open production, limited effective action in Oklahoma and Texas, two leading producing states, from 1948 through 1975. Opposition to controls continued in the face of enormous aggregate losses. The center of contention among oil firms was the distribution of crude oil rents after regulation. Small firms feared that the proposed regulations would make them worse off by limiting their ability to drain neighboring oil leases (owned by larger firms). No agreement on compensation could be reached to allow for enactment of strict production controls.

Other related research includes Johnson’s 1985 analysis of dairy price controls, Alston’s 1984 study of farm foreclosure moritorium legislation in the 1930s, and Pincus’ 1975 examination of the effectiveness of industrial pressure groups in the Tariff Act of 1824. Useful surveys of the literature as well as examination of additional property rights and regulatory issues can be found in McCraw (1975, 1981) and Galambos (1983).

This brief and incomplete summary of empirical work shows the critical role played by competing interest groups, politicians, and bureaucrats in molding institutional development. The motivating forces are the distribution of any increases in income that result from property rights and regulatory change and the resulting impact on the division of political power. Hence, across societies and time there will be differing institutions, depending on political and economic conditions. Given the behavioral consequences of varying social organizations, societies with otherwise similar resource endowments can have dramatically different production and distribution patterns. Accordingly, attention is necessary to the par-
ticular property rights arrangements if differences in economic performance are to be understood.

C. Types of Property Rights

Property rights exist as a continuum. They range from open-access conditions at one extreme to limited and vague rights definitions, and to specific, exclusive property rights at the other extreme. Property rights may be held by individuals (private property rights), groups (collective rights), or the state (an extended form of collective rights). As described above, distributional concerns compete with efficiency considerations in determining the nature of the property rights adopted.

Equity considerations are particularly relevant in the assignment of private property rights, because they provide the most exclusive ownership structure. Despite their ability to link the private and social net benefits of resource use in production decisions, private property rights formally and visibly designate a particular wealth distribution. Resulting political conflict over the distribution of wealth may lead to sharp restrictions on the extent of private rights granted to individuals. As an alternative, collective rights, including state ownership, are often considered politically more palatable for mitigating open-access losses because they do not formally assign title to individuals.

While they may be attractive from an equity point of view, collective rights have important efficiency problems. First, even though nongroup members are excluded from resource use, unless intragroup controls are implemented, near open-access conditions still emerge. In the absence of intragroup controls, marginal private and social benefits and costs are not equated for members. Accordingly, the full social benefits and costs are not considered in private economic decisions and suboptimal uses and lower resource values result. Second, these critical intragroup controls are not free of distributional pressures. While formal titles are not assigned, the intragroup regulations must still determine access and individual ability to collect income from resource use; hence, distributional conflicts can continue to mold intragroup controls, much as they do with private property rights. Indeed, in both cases, distributional goals set by political pressures may severely constrain economic activity by attenuating both private and collective property rights.

III. RECENT PROPERTY RIGHTS RESEARCH: NATURAL RESOURCES, ENCLOSURES, AND LAND TENURE CONTRACTS

A. Property Rights to Natural Resources

The analytical concepts described above have been incorporated in analyses of property rights to natural resources in the American West. This is a particularly fruitful area for research and test of theory because both the initial development of property rights and their subsequent
transformation in response to economic and political factors can be observed.

Between 1781 and 1853, the federal government acquired over 1,327,000,000 acres of land, most of which was made available for private patenting. The federal land laws that defined the procedures for claiming surface land imposed limits on the number and size of individual claims. The most complete discussions of federal land law are by Gates (1968, 1981). Where those limits were in conflict with larger, more efficient allotments, various practices were employed by claimants to evade the law. Those practices, however, raised transactions costs and delayed the definition of property rights to federal land. Mineral deposits were an exception, since there were no binding policy constraints on private claims to federal mineral land. In the latter case, local property rules developed in mining areas and subsequently were codified into state law.

In examining contracting for property rights to federal lands, it is possible to follow the impact of important variables in institutional development such as changes in land value; political pressures on land distribution; legislative and judicial rulings that affected the costs of patenting federal land; differing production techniques; varying resource characteristics and limited information about them; and finally, the number and heterogeneity of the bargaining parties. Moreover, the impact of differing property rights institutions on production and income can be observed.

Mineral rights to gold and silver deposits provide almost laboratory conditions for examining contracting for ownership arrangements. The discovery of valuable ore deposits in the West brought dramatic increases in land values in an area where property rights were not yet defined and where no legal procedures existed for assigning mineral rights. Since no land claims existed at the time of ore discovery, there were no direct redistributional effects from the local allocation of mineral rights. The lack of important redistribution effects reduced the bargaining and political costs of developing property rights institutions to federal mineral land.

Studies of western mineral rights by Hallagan (1978), Libecap (1978a,b, 1979), McCurdy (1976), and Umbeck (1977a,b, 1981a), reveal the rights arrangements were adopted quickly and without significant violence to reduce potential conflict and uncertainty over claims. Such arrangements were needed if attention was to be directed to mining and investment. Moreover, these studies show that the contractual forms adopted by miners economized on transactions costs.

Umbeck and Hallagan examine the allocation procedures to delineate access to mineral land in California. Umbeck focuses on the initial rights assignment during the gold rush of 1848 to 1850. Hallagan analyzes share and rent contracts for a later period, 1870 to 1900. Umbeck argues that mining claims were smallest and defined most precisely on lands with
the highest expected ore yields. On such claims, competition was the
greatest and the returns to contracting to limit access the highest. While
share contracts among prospectors were popular during the early gold
rush, higher enforcement costs led to their rapid displacement by private
land allotments. The key problem with share contracts, according to
Umbeck, was monitoring labor input. Those enforcement provisions were
unnecessary for individually owned and worked claims.

Unbeck’s miners largely were tapping placers or surface ore deposits
where information on the location and amount of ore could be obtained
at relatively low cost. Hallagan examines property rights arrangements
to placers and deep-vein ore, which was much more difficult to locate
and trace. He is interested in the agreements reached between land
owners and miners for access to the land and the conditions under which
share or fixed-rent contracts were chosen. Hallagan argues that contractual
choice was influenced by available information and the mining technology
involved. For deep-vein ore, little information on the nature and extent
of the deposit existed prior to mining. Risks were high, new contingencies
were likely, and possibilities existed for deception by the miner in revealing
the value of any discovered ore. Moreover, claim-specific capital investment
was required, encouraging opportunism by the land owner, since the
miner would have few options once the investment was made (Williamson,
1975). In those circumstances, Hallagan found that mineral land was
leased to miners through share contracts. Share contracts reduced re-
contracting costs, spread risk, and minimized opportunism by both parties.
On the other hand, he found that prepaid fixed rents were used by miners
to lease exposed placers (surface ore) and tailings, where little claim-
specific investment was required and where more information existed on
the ore’s location and extent.

Libecap analyzes the development and timing of legal institutions to
define mineral rights along the Comstock Lode in Nevada from 1858 to
1895. He finds that mining claims were made increasingly precise as new
ore discoveries raised land values. Libecap follows the evolution of
mineral rights structures from informal mining camp rules in 1858 to
specific statutes and judicial rulings under, first, the territorial government
in 1860 and, later, the state government in 1864. Individual laws and
court cases are examined to show how they increased the precision of
mineral rights along the Comstock. The proponents of new legal institutions
in Nevada were the leading mining companies with the most valuable
claims. Those claims had the greatest ownership uncertainty due to disputes
by competitors, and they offered the greatest returns to a more definite
delineation of rights. Through legislative and judicial activity, mineral
rights to the Comstock Lode were made so secure that the gains from
additional legal activity declined. After 1868, there were few statutes or
court rulings regarding mineral rights, even though dramatic new discoveries along the Comstock raised production and claim values through 1876.

In a related study, McCurdy analyzes the development of California mineral and water law and notes its impact on the emergence of legal doctrine in other western states. His focus is on the role of the California Supreme Court in translating and refining mining camp rules into a consistent body of law. Because of the rapid growth of the mining industry in California when property rights to mineral land, water, and other resources largely were undefined, continuing conflicts required resolution by the courts. Through the judicial rulings outlined by McCurdy, California mineral, water, and agricultural land rights were defined.

In contrast to federal mineral rights, property rights to surface land were molded by the distributional goals of federal land policy. The general aim, particularly after 1862, was to promote the development of small farms of approximately 160 acres by restricting the number and size of individual claims that could be patented. In the West, where rainfall was limited and land conditions poor, larger land allotments than those legally available were required for efficient operation. Accordingly, either informal and often illegal property rights arrangements were employed or fraud was committed to circumvent the restrictions of the land laws. Informal rules provided uncertain tenure as competition for land increased with no recourse to patenting, and fraud raised the transactions costs of obtaining property rights, thereby delaying them and encouraging continued open-access conditions.

Studies of property rights to western lands include Anderson and Hill (1975), Dennen (1976), and Libecap (1981a,b). Dennen analyzes local livestock associations formed to provide some exclusive control over the land and mitigate rent dissipation from uncontrolled use. He finds that the associations were at least temporarily successful in raising land rents. Memberships were highly valued, and animal losses from severe weather appear to have been less where livestock associations were effective in maintaining grass stands for winter forage. After 1870, those informal arrangements became increasingly tenuous due both to greater competition for land from new settlers and to actions by the federal government to ensure compliance with the acreage restrictions of the land laws. In many areas tenure insecurity increased, bringing severe overgrazing and a deterioration in land values and income.

Libecap analyzes the roles of the Departments of Agriculture and the Interior in opposing a relaxation of the land laws to allow for larger, more efficient claims. Neither department had incentives to support livestock owners in their efforts to patent larger allotments of land. The Interior Department's General Land Office was established to verify and process individual land claims and was closely allied with homesteaders. Libecap argues that the agency's budget appropriations, staffing, and
commissioner incomes were enhanced by the piecemeal allocation of land. On the other hand, the Forest Service in the Department of Agriculture was established to manage federal lands, not to dispose of them. Both departments competed for administrative jurisdiction over federal lands.

Lacking the ability to patent the land they used, ranchers illegally fenced millions of acres of the federal domain to define their claims and to control access. The fences, however, were a barrier to homesteaders and were opposed by the Interior Department. Libecap examines the removal of fences and the associated costs of overgrazing as open-access conditions emerged. Formal controls on land use through leases were not made available until 1934, with the enactment of Taylor Grazing Act.

Similar distributional goals constrained the assignment of secure property rights to grazing land on southwestern Indian reservations (Carlson, 1981; Johnson and Libecap, 1980b; and Libecap and Johnson, 1980). While Indian lands long had been subject to ownership and use restrictions, major policy changes occurred with the Indian Reorganization Act of 1934. The Act halted the division of Indian land into private allotments and on many reservations instituted a communal property system with a more or less equal assignment of usufruct privileges to tribal members. On Apache, Navajo, and Pueblo reservations, the tribal councils were given authority to issue temporary but renewable grazing permits. These usufruct provisions brought an uncompensated redistribution of land from existing (and often large) herders. Johnson and Libecap argue that opposition to the reassignment of land hindered adoption of formal permit systems. On the Navajo reservation, the permits led to a proliferation of very small herders, often with too few animals to support a family. Evasion of permit limits followed, but political pressure on the tribal council led to only loose enforcement of authorized stocking levels. Overgrazing resulted, threatening the traditional pastoral economy. Unfortunately, federal Indian policy offered no institutional remedies.

A third resource affected by federal land policy was timber land. Libecap and Johnson (1979; Johnson and Libecap, 1980a) examine the effect of limitations on claiming and patenting forest lands. The rapid harvest of Great Lakes and Pacific Northwest forests was criticized sharply at the turn of the century by conservation groups in their lobbying efforts to establish and expand the National Forests. In the Pacific Northwest, lumber firms generally resorted to fraudulent use of the Homestead, Preemption, and Timber and Stone Acts to secure property rights to timber land. Johnson and Libecap estimate that up to half of the land claims filed in the Northwest were illegal, and the added costs of fraud were about $17,000,000 over the period 1881 to 1907, an amount that exceeded the total revenues received by the federal government from land sales in the region. Those added costs delayed the establishment of clear property rights to land in each area for up to 6 years, leaving
the land vulnerable to the rapid harvests and other timber deprivations criticized by conservationists.

B. Enclosure of Common Fields

Another area of extensive empirical research on the relation between government and property rights is the Parliamentary enclosure of common fields in England. There is an important terminology clarification to be made at this point. Common fields were not open-access resources in a fisheries sense. Rather, they were a grouping of many individually-worked small plots or holdings whose uses were communally regulated within the common field. Studies of enclosure include Allen (1982), Cohen and Weitzman (1975), Crafts (1977), Dahlman (1980), Martin (1979), McCloskey (1972, 1975), and Yelling (1977). During the years from 1700 to 1850, over 5000 Parliamentary Acts were adopted to promote consolidation of numerous use rights to common fields. Over half of the agricultural land in England was involved. Private contracting to consolidate holdings required unanimous agreement of the many small farmers in each area to be enclosed. Under those conditions, any farmer could block consolidation, and all had incentive to hold out for side payments in exchange for their support. Faced with those barriers to agreement, proponents turned to Parliament to impose majority decision rules in enclosure efforts. McCloskey focuses on the efficiency gains from enclosure and argues that to understand the timing of Parliamentary intervention it is necessary to examine changes in the expected costs and benefits of land consolidation as well as the much emphasized distributional effects. McCloskey and Dahlman assert that forced enclosures were motivated by changes in market conditions and the increase in output possible from consolidation and larger-scale commercial agricultural production. Where enclosures were limited, McCloskey conjectures that distributional concerns among larger land owners were more important in blocking agreement than resistance by small land owners.

Crafts is also concerned with explaining the timing of enclosure. He analyzes the net benefits of consolidation and concludes that changes in real wheat prices and interest rates were of less significance than were money prices and expectations. Similarly, Yelling examines differences in the costs and benefits of enclosure in order to understand why common fields persisted for so long. He and other students of the matter have hypothesized that the political costs of forced consolidation depended, at least in part, on the form of common field organization. Enclosure often had a large one-time cost, due to opposition from small land owners. Where holdings were irregular and scattered, coordinated opposition was costly to muster and enclosure could gradually proceed. Where small holdings were concentrated, common fields were more difficult to enclose. Finally, Martin argues that political opposition to enclosures was reduced
where absentee landlords predominated and the number of owner-cultivators was small.

Grantham (1980) also examines the political costs of forced consolidation of land holdings to explain the lack of enclosures in France relative to England and other European countries. He isolates two factors that limited state intervention to shift property rights: first, land ownership in much of France was diffuse and characterized by many small plots. Such conditions raised political opposition to compulsory enclosure, despite apparent aggregate social gains. Second, the legacy of turmoil in 19th century France left a weak central government and no constituency for expropriation. Indeed, there was widespread resistance to adjustments in the land laws. As a result, unanimity voting rules were retained for enclosure negotiations, and transactions costs for agreement remained high.

C. Land Tenure Contracts


Cheung challenges the long-held view that share tenancy is inefficient because it provides incomplete property rights to land with incentives for short-term, wasteful use. Because of high monitoring costs, it is asserted that land owners cannot prevent their tenants from mining the soil and otherwise lowering its value. Cheung counters that share tenancy can raise output by spreading the risk of agricultural production and marketing between the owner and tenant. Reid concurs that share tenancy is efficient, but for reasons other than risk sharing. He argues that share tenancy links the managerial experience of the owner to the tenant and reduces renegotiation costs when contractual terms must be adjusted following changing crop and market conditions.

Wright examines the constraints affecting the choice of fixed rent or share tenancy contracts. He places less stock in the notion that share tenancy was used to shift risk between owners and tenants and instead argues that asset ownership was a key determining factor. Those tenants without mules and agricultural tools could not enter into fixed rent contracts and instead selected sharecropping arrangements where mules and implements were supplied by the land owner. Alston and Higgs are also interested in contractual choice and the determinants of the diversity of contractual arrangements, including fixed rent, share tenancy, and wage contracts in Southern agriculture throughout the late 19th and early 20th centuries. Higgs emphasizes farm size and differential relative risk aversion
between tenants and land owners in contract selection. He argues that share contracts were more likely than fixed rents as risk increased. Given risk, fixed rents were more likely relative to share rents, and all tenancy more likely relative to wage contracts, as farm size increased. In their joint paper, Alston and Higgs incorporate risk, the relative resource endowments of the parties (the managerial skills and physical capital endowments stressed by Reid and Wright), and the transactions costs of supervision and enforcement in analyzing the selection of contractual terms over time and across the South. Finally, Alston investigates why wage contracts gradually replaced share tenancy in southern agriculture between 1930 and 1960. He compares the negotiation, supervision, and enforcement costs of both wage and tenant contracts, and concludes that increased mechanization in the South after 1930 reduced the costs of supervising labor input. The fall in monitoring costs reduced the advantages of tenant contracts and encouraged adoption of wage contracts.

IV. THE POLITICAL ECONOMY OF PROPERTY RIGHTS AND REGULATION OF CRUDE OIL PRODUCTION IN THE UNITED STATES FROM 1920 THROUGH 1972

This section outlines in more detail recent research on property rights and the competition between efficiency and equity concerns in institutional development. The focus is on contracting to control crude oil production in the United States from 1920 through 1972. The analysis reveals most clearly the costs of common property conditions and the complications encountered in devising solutions. The arrangements adopted not only determined property rights to oil production but the timing of output, input mixes, and investment in the industry.

A. Common Pool Production and the Incentive to Contract

Oil reservoirs are commonly found beneath numerous, independently owned surface tracts. In the United States, mineral rights are usually reserved to the surface land owner and are leased, not permanently transferred, to third parties. Through leasing, multiple firms gain access to the reservoir and compete for oil, establishing the conditions for common pool production. Under the rule of capture, property rights to crude oil are assigned only upon extraction. Oil in the reservoir is migratory and compressed under high pressure. A firm can drain neighboring leases by drilling multiple wells and rapidly extracting oil. Each well sunk creates a pocket of low pressure around the well bore, which stimulates oil migration toward the well as oil rushes to the low-pressure area. Rapid production prevents pressure from equalizing, and migration continues. Moreover, drilling and extracting early in the life of an oil field allow firms to take advantage of high subsurface pressures that expel
the oil to the surface at low marginal extraction cost. As the field ages through rapid production, those pressures are dissipated, forcing adoption of pumps and other artificial extraction techniques at much higher marginal cost.

Given migratory oil, extraction costs, which are known to rise later, and fragmented surface holdings, each firm has incentive to drill competitively and drain the reservoir. The classic costs of common property follow with rent dissipation due to high capital costs—redundant wells and extensive surface storage, a time path of production that does not reflect user costs, and reduced total oil recovery. The latter occurs as the premature venting of subsurface pressure from rapid oil withdrawal leaves oil trapped in geological formation and retrievable only at very high extraction costs.

Since the first commercial production of petroleum in the United States in 1859, firms were confronted with the technological losses of the common pool. In 1910, estimates of oil losses from fire and evaporation due to reliance upon surface storage in California were as high as 11% of the state's production. In 1914 the Director of the Bureau of Mines estimated annual losses from excessive drilling were $50,000,000, a quarter of the value of total United States production. In 1937, the American Petroleum Institute estimated that excessive wells cost $200,000,000.

Technological losses from common pool production were not the only incentive to control oil extraction. Financial losses provided another reason. Competitive extraction on newly discovered fields brought dramatic increases in crude oil supplies and a corresponding drop in prices. Prices remained low until subsurface pressures were depleted, marginal costs rose, and output fell. The pecuniary losses of firms from low prices became particularly severe after 1926, with the unprecedented clustering of major oil discoveries in the United States, which almost doubled known oil reserves and output. Crude prices declined from $2.29 per barrel in 1926 to $0.18 per barrel in 1931, and to $0.40 per barrel in 1933. Moreover, price fluctuations were a major source of uncertainty through 1933. From 1913 through 1933, when open production was characteristic, there were 67 nominal midcontinent crude oil price changes. From 1934 through 1972, government-imposed output controls brought higher and more stable prices. During that time, there were only 24 price changes.

**B. Private Contracting to Limit Oil Production**

Libecap and Wiggins (1984, 1985; Wiggins and Libecap, 1985) examine the options available to firms for mitigating common pool losses, including consolidation of oil leases through purchase, unitization, and output pro-rating. With unitization, a single firm is selected to develop the field and all other firms that otherwise would be producing receive a share of the net returns. Accordingly, both lease purchase and unitization
reduce the number of firms on each formation, thereby lowering the incentive to extract competitively. On the other hand, with prorationing, all parties remain on the field, but total production is fixed and quotas are prorated among the eligible leases.

In their examination of five major oil fields in Oklahoma and Texas from 1926 to 1935, Libecap and Wiggins find little lease consolidation. Moreover, their analysis of field unitization in both states from 1948 through 1975 shows that private unit agreements were uncommon. Examination of bargaining on seven fields in Texas reveals that agreement took from 4 to 8 years, with contracts completed only late in field life after most common pool losses had been inflicted.

These findings temper the optimistic belief of some economists that private solutions will emerge to prevent serious efficiency losses. Libecap and Wiggins argue that market solutions through consolidation or unitization were thwarted by disputes over lease values due to information problems and firm heterogeneities. In unitization bargaining, the sharing formula is the central issue. It defines a once-and-for-all share of unit rents with no contingent updates. Share updates cannot be made because unitization changes production patterns and reservoir dynamics in ways that make it impossible to link individual leases to unit output. Such linkages are necessary to redefine unit shares.

During negotiations, there is uncertainty regarding the estimation of lease values, particularly for the most productive, longest-lived leases on the field. Estimates are a function of surface acreage, number of wells, subsurface pressure, porosity and volume of the producing formation, oil migration, and estimated remaining oil reserves. Most of the parameters are not observable and involve subjective interpretation by company engineers, using limited and often controversial data. Moreover, there is no accepted procedure for mapping the parameters to lease values. Each firm develops a private estimate of the value of its leases, and that value often conflicts with the calculations of other firms on the field. New information for estimating lease values is generated through production, and as leases near the end of their productive lives, private and public value estimates converge. At that point, agreement is likely, but the costs of the common pool largely have been born. At any time, whether a firm agrees to join the unit depends upon whether the expected gain in its share through delay and the generation of new lease value information offsets the firm’s share of field losses from continued non-unitized production.

C. State-Enforced Solutions to the Common Pool

With the failure of private contracts to limit production on individual oil fields, firms turned to government for regulatory controls. They also had another objective in appealing to government regulation that neither
unitization nor lease consolidation on a field would achieve. While the technological losses of common pool conditions could be mitigated by field-specific agreements, the losses from falling and unstable prices required coordination across all fields. Given the large number of firms and fields in the United States in the 1930s, effective cartelization of production to raise prices was possible only with government enforcement of output limits. The resort to government regulation, however, was not without complication, because it added political considerations in developing output controls.

Three empirical cases illustrate the impact of political factors in determining the nature of regulation and property rights to crude oil. Two of the cases involve unitization, and the last involves prorationing.

The first unitization case is Teapot Dome. Libecap (1984), reexamines the naval reserve leases issued by Interior Secretary Fall in 1922 that effectively unitized portions of the Elk Hills, Buena Vista Hills, and Teapot Dome reserves. Because the leases covered most of the producing formations and were to single firms, they reduced common pool conditions and were superior to leasing policies used elsewhere on federal land. Other federal land was leased under the Mineral Leasing Act of 1920, which authorized much smaller, 640-acre leases for production and thereby placed multiple firms on each field.

Despite their efficiency advantages, the naval reserve leases were immediately attacked by small oil companies, excluded from the reserves and by conservation groups. While the opposition from small oil firms is understandable from an equity point of view, the behavior of conservation groups is less clear. The opposition of conservation groups, however, grew out of jurisdictional rivalries from 1891 through 1934 between the Interior and Agriculture Departments for administrative control of the National Forests, National Parks, federal rangeland, water power sites, and oil lands. Conservation groups allied with Agriculture to oppose the transfer of the National Forests to Interior. Secretary Fall favored the transfer, but conservationists feared Interior would promote development over preservation. The controversy over Teapot Dome and the other naval reserve leases arose as part of the conflict over the National Forests. Bureaucratic competition for control of federal land, not conservation, was the primary concern. Ironically, the same unitization provisions incorporated by Fall were made part of all federal oil leases after 1930.

A second unitization example of the role of political factors is the varied reaction of state governments to the failure of firms privately to unitize oil fields. Libecap and Wiggins examine the unitization regulations adopted in Oklahoma, Texas, and Wyoming from 1948 through 1975. In Texas the Railroad Commission requires unanimous agreement of all parties before a field can be unitized. Further, the field must be fully defined by developing all leases before a unit will be approved. Oklahoma also requires full development, but it allows a 63% majority rule to force
parties into a unit. In Wyoming, which is largely federal land, federal rules apply. A majority voting rule is employed as in Oklahoma but, significantly, units are approved during exploration. That provision allows unit discussions to occur before differences in lease values emerge to block agreement. During exploration, the parties are more or less equally ignorant regarding oil location and lease value. Unit agreements are concluded rapidly with revenue sharing determined by simple, observable parameters such as surface acreage. By contrast, in Oklahoma and Texas negotiations occur much later and are protracted with disputes over lease values and unit shares. Further, the unanimity rule in Texas poses a formidable barrier. The results of the differing regulatory regimes are predictable. Wyoming had the largest share of production from fully unitized fields, 82% in 1975, while Oklahoma had 38% and Texas only 20%.

Libecap and Wiggins find that the observed differences in unitization regulation are due to the differential political influence of small firms in the three states. In Oklahoma and Texas, small firms benefit from open production and prorationing regulations (see below). Compulsory unitization could dismantle those advantages, since a majority on a field could redefine property rights through the unit share formula. The incidence of small firms is greatest in Texas, where they have been influential in blocking unitization regulation. Small firms are less influential in Oklahoma, and they could not prevent adoption of a majority decision rule, though the full development provision provides them with some protection. On federal lands, where leases are larger and the number and influence of small firms correspondingly less, favorable regulations to promote unitization were adopted after 1930 with little controversy.

The final example of the importance of political factors in molding property rights and regulation is output prorationing. In the presence of widespread opposition to unitization and little lease consolidation, state governments adopted prorationing rules that set aggregate state oil production levels and assigned quotas to individual wells. Libecap and Wiggins (1984; Wiggins and Libecap, 1986) analyze prorationing controls in Oklahoma and Texas from 1926 through 1933. They argue that to achieve political support for controls on the most costly forms of rent dissipation from common pool production, concessions were made to opponents of regulation, permitting less extensive dissipation along other avenues. While aggregate production costs were not minimized, prorationing rules brought at least some rent savings.

Prorationing rules were controversial because by defining the authorized monthly production for each well, they defined property rights to oil. Even though all firms were faced with common pool conditions, there were differential incentives for large and small firms to agree to government regulations. Since firms with larger market shares and leases internalized
more of the technological and financial losses of common pool production, they were the major advocates of control. Indeed, they were willing unilaterally to reduce output if firms with very small leases and market shares could be prevented from simultaneously raising their output. During the political debates in Oklahoma and Texas, large firms supported the assignment of preferential quotas to small firms to win support for prorationing. Small firms were given quotas that rationed output on a per-well basis, allowing them to drill densely and increase their share of oil production and rents. Further, the Texas Railroad Commission granted small firms sufficient production quotas to cover drilling and operating costs. Despite these regulatory advantages, small firms repeatedly violated their quotas until NRA controls were imposed in 1933. By contrast, the largest 25 firms in Oklahoma and Texas were never implicated in any cases of quota violation through 1935.

The prorationing rules adopted in each state also provided the framework for cartelizing interstate production from 1933 through 1972. Because of Texas' large reserves and production, the Texas Railroad Commission was the key agency in interstate market demand prorationing to fix output and prices. Libecap (1986) shows that political pressures on the Commission from small and high-cost oil producers led to the adoption of cartel policies that violated collusive profit-maximization rules.

To provide security for property rights to oil in Texas, the Railroad Commission adopted a price stabilization policy, since price fluctuations were a major source of uncertainty for firms, given widely varying production costs. Further, to protect high-cost producers, the Commission targeted a price that covered their average total costs. Raising prices to that level, however, forced the Railroad Commission to constrain sharply the larger, low-cost producers in Texas, so that cartel output did not come from low-cost supply sources as required for profit maximization. Additionally, prices that protected high-cost producers on older fields invited exploration and expanded production in other states at the expense of Texas, and the state's market share declined below its share of U.S. oil reserves.

Nevertheless, while the Railroad Commission did not follow standard cartel output and pricing rules, it secured sufficient political support to maintain regulatory authority over Texas production. Also, by constraining low-cost Texas output and protecting high-cost producers in other states where fields typically were older, the Commission marshalled interstate support for its regulations from 1933 to 1972. Such support preempted efforts by the Interior Department to regulate the oil industry as a public utility. Federal regulation, less responsive to local pressures, was considered a grave threat by Texas oil firms to the property rights structure that existed in the state under Railroad Commission rules.
V. CONCLUDING REMARKS AND IMPLICATIONS FOR FUTURE RESEARCH IN PROPERTY RIGHTS INSTITUTIONS

There is a resurgence of interest in the role of property rights and related regulatory institutions in determining the patterns of economic growth and income distribution within societies. This is a result of frustration with conventional neoclassical analyses and a recognized need to fortify them with inclusion of institutional considerations. Incorporation of property rights into analysis does not come, of course, without cost. In the development of predictive models, the specification of the transactions costs of information, measurement, negotiation, supervision, and enforcement and the political factors underlying property rights arrangements is difficult. Further, causality is generally reciprocal, with economic and institutional influences interacting and affecting the forms taken by each. Moreover, the associated empirical research is complicated because attention is required on the specific details of contractual relationships. Particular care is necessary in identifying the claims and activities of the various competing parties that mold the processes of economic and institutional change.

There are clear challenges, then, in theory and in empirical work. The research outlined in this paper reveals that much has been accomplished in the comparative static testing of theory regarding the impact of varying property rights on behavior. Progress also has been made in the more complex problem of institutional change. In those studies, bureaucratic and political factors and transactions costs have been systematically incorporated to examine the development of particular property rights arrangements, to explain why seemingly perverse institutions persist in the face of large social losses, and to address why many contractual responses to new economic opportunities appear to be incomplete.

More research is needed to isolate the economic and equity effects of various property rights and regulatory structures and to identify how information problems, transactions costs, and political pressures influence the development of institutions. Among social scientists, economic historians are particularly suited to deal with these issues. They have the theoretical background for developing the critical questions, and they have the empirical focus needed for analyzing the details of property rights contracts and the bargaining that underlies them.

REFERENCES

Dahlman (1980), _The Open Field System and Beyond, A Property Rights Analysis of an Economic Institution_. Cambridge: Cambridge Univ. Press.


Libecap, G. D. (1986), *The Political Economy of Cartelization by the Texas Railroad*


