THEORETICAL AND EMPIRICAL INVESTIGATION INTO PROPERTY RIGHTS FORMATION; CASE STUDY: THE SOUTHERN ONTARIO OJIBWAY

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BASSIMA CHAMI

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ABSTRACT

THEORETICAL AND EMPIRICAL INVESTIGATION INTO PROPERTY RIGHTS FORMATION: CASE STUDY: THE SOUTHERN ONTARION OJIBWAY

Bassima Chami
University of Guelph, 1999

Advisor:
Dr. Glenn Fox

The purpose of this thesis is to test Umbeck's theory of the formation and initial distribution of property rights. Based on Umbeck's theory, a model that describes the process of distribution of property rights to fisheries among competing fishermen is developed. The implications of the model were 1) wealth is distributed equally only when the competing parties are equal in their ability to use force, 2) the most forceful party or individual will receive more wealth than those who are relatively weak. The case study of the settlement of the Ontario Peninsula is an empirical test to the model's second implication. The variance of force between the competing parties, over land and fisheries, provided a test to the correlation between force and distribution of ownership rights. The significance of the loss of the Ojibway fishing rights in the Bruce Peninsula reinforces Umbeck's theory of force.

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TABLE OF CONTENTS

LIST OF TABLES

PAGE

LIST OF FIGURES

PAGE

CHAPTER TWO

CHAPTER THREE

LIST OF MAPS

CHAPTER FOUR PAGE

CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND

North (1990) defined institutions as formal and informal rules that constrain individual behaviour and shape human interaction. Informal rules include, among others, convictions, ideologies and dogmas. "Formal rules include political (and judicial) rules, economic rules, and contracts...Political rules broadly define the hierarchical structure of the polity, its basic decision structure, and the explicit characteristics of agenda control. Economic rules define property rights, that is the bundle of rights over the use and the income to be derived from property and the ability to alienate an asset or a resource (North, 1990)." Adopting the definition above, institutional change in this thesis refers to the change in the economic rules that define property rights; thus, it refers to a change in the assignment of ownership of valuable assets; a change in the designation of who bears the rewards and costs of resource-use decisions; and a change of the actors in the economic system.

Fox and Ivy (1998) identified four economic theories of property rights: utilitarianism, legal positivism, pragmatism and classical liberalism. Each theory determines the nature of property rights and the desirability or permissibility of an institutional change.

Under utilitarianism, property rights are transitory: they are not inalienable or intrinsic. "Utilitarianism treats property rights like a system of name tags. Each name tag specifies an individual's right to possession, use, and disposition of property at a point in time. However, a redistribution of those rights can occur if the agency responsible for advancing the sum of all utilities determines that such a redistribution is in order (Fox and Ivy, 1998)." In sum, an institutional change that increases the sum of utilities or improves efficiency in the use of resources is a good action. Pragmatism is similar to utilitarianism in that it considers property rights as circumstantial. Property rights should be constantly tailored to best suit the welfare of society. However, pragmatism does not advocate utilitarianism's goal of maximising the sum of utilities.

For legal positivism, rights as expressions of power. "...[T]he legal positivist framework commonly uses the metaphor of a bundle of sticks to describe the nature and content of property rights. Each of the sticks constitutes legislative permission for property owners to take approved actions with the things that they own. However, the sticks in the bundle are transitory. They depend on actions that legislative authorities recognise as socially permissible actions according to law (Fox and Ivy, 1998)." Thus, under legal positivism, an institutional change is permissible or desirable only if the government legislates these changes into law. Finally, in contrast to the above theories, rights are intrinsic or inalienable under classical liberalism. Property, as opposed to rights, can be exchanged or redistributed. "The agency responsible for advancing the sum of all utilities" or the legislative government do not, cannot, create rights or redistribute property rights. Hence, unless an institutional change is the mere protection of life and property from the coercive actions of other persons, an institutional change is not permitted.

While each of the four theories offers an answer to basic ethical and social question, the conceptual foundation of each theory is distinct (Fox and Ivy, 1998). At this point, one wonders what is the particular property right theory that is maintained and exercised pending an institutional change. What is the relevant form of competition or the relevant constraint that determines the adoption of a particular property rights theory? The choice of a particular property right theory impacts the performance of an economy for at least two reasons. "First, by assigning ownership of valuable assets and designating who bears the rewards and costs of resource-use decisions, property rights institutions structure incentives for economic behaviour within the society. Second, by allocating decision-making authority, the prevailing property rights arrangements determines who are the actors in the economic system (Libecap, 1989)." Because of these impacts on economic activity and on the distribution of wealth, it is important to analyse how various property rights institutions, including institutional change, emerge.

Institutions or an institutional change requires for its maintenance the acquiescence and the support of the bulk of people; otherwise, the institutions become irrelevant. Such support requires the provision of incentives to recognise the institutions (MacPherson, 1973). In the same context, Libecap (1989) maintains that the bargaining parties must see their welfare improved or at least made no worse off in order to support any institutional change. For Umbeck "[p]otential force is the relevant constraint underlying any initial agreements (and subsequent agreements) which allocate wealth among competitors. It is relevant in the sense that the agreement, regardless of the competitive criterion used, must ration to each individual at least as much wealth as he could have through the use of his own force or there will be no agreement Umbeck (1981, p.40)." Force, not fairness- or

social wealth maximisation- determines the distribution and enforcement of property rights in a society (Umbeck, 1980, p.57).

This thesis is concerned with the element of force essential in the agreement on and enforcement of an institutional change. Umbeck (1981, pp.39), in his theory of the formation and initial distribution of property rights, maintains that "ownership rights to property can exist only as long as other people agree to respect them or as long as the owner can forcefully exclude those who do not agree." Even if an explicit agreement among individuals to assign and respect each others' ownership rights exist, the threat of force or some enforcement measures will still be required. In the same context, the interest-groups theory describes the change in and formation of property rights as the outcome of a supply and demand process. Demanders of a property rights change are constituents; Supplier of a property rights change is the government.

The government is the sole supplier of an institutional change because it "has one basic resource which in pure principle is not shared with even the mightiest of its citizens: the power to coerce (Stigler, 1973)." Benson (1990), similarly, depicts the role of the legal system, including the legislature, the enforcement bureaucracy, and the judicial bureaucracy, as institutions to effectively facilitate ***involuntary*** transfer of wealth or property rights once mutual agreement among bargaining parties fails.

Libecap (1989) referred to the process of defining or changing property rights as contracting. This thesis is trying to explain the contractually agreed upon distribution of land and fisheries ownership in the Bruce Peninsula between the government and the Saugeen Ojibway First Nations.

1.2 THE ECONOMIC RESEARCH PROBLEM

The Bruce Peninsula was the traditional fishing ground of the Saugeen Ojibway First Nations since 1701. The enactment of the Constitution Act s.35(1), 1982, "Rights of the Aboriginal Peoples of Canada," recognised and affirmed aboriginal and treaty rights. In *Regina vs. Jones* (Ontario Reports, 1993), Justices, Dickson and Laforest stated that "[t]he constitutional recognition...therefore gives a measure of control over government conduct and a strong check on legislative power...The government is required to bear the burden of justification of any legislation that has some negative effect on any aboriginal right protected under s.35.(1)."

Notwithstanding the provincial court recognition, the Ministry of Natural Resources is reluctant to recognise the Aboriginal fishing rights and their priorities over non-Aboriginal commercial and sport fishing. The conflict among these interest groups is wasting valuable resources in terms of capital, labour, output and time. In the summer of 1996, four native fishermen were stabbed; ten thousand meters of commercial nets and one fishing boat were destroyed. Theft of fish was reported. One native fisherman reported a loss of more than $30,000 in fishing equipment in 1995 (Valpy, 1996). These incidents are directly linked to the conflict between the native and the non-native people over the fishery use and ownership rights. Finally, one must add to these costs the cost of expensive litigation and court rulings over who have the right over the fisheries.

The problem of compliance with the Constitution arises from the fact that the major parties in the conflict have no incentives to abide by the new ruling (Alston *et al*, 1996). Umbeck (1981) maintains that potential force is the relevant constraint underlying any

initial agreement on contracts or institutions that allocate rights among competitors. Regardless of the competitive criterion used. force is relevant in the sense that the agreement must ration to each individual at least as much wealth as he could have through his own force or there will be no agreement.

1.3 PURPOSE

The purpose of this thesis is to test Umbeck's theory of the formation and initial distribution of property rights. Using the history of the Ontario Peninsula settlement. the thesis will test whether force is the relevant constraint that underlies an institutional change. including of course the allocation of valuable resources among competing parties. The empirical test is set on the formation. initial distribution and the erosion through time of the Native People rights to the land and the fisheries in the Bruce Peninsula. The data is collected from contracts or Treaties and Surrenders written during the non-native people colonisation of the Bruce Peninsula.

1.4 OBJECTIVES

1. To compare and evaluate the theories that predict the way in which property rights arrangements respond over time to changing economic opportunities. The purpose is to determine the relevant factors that pattern an institutional change. The reviewed theories are 1) Demsetz's theory of property rights, 2) interest group theory and 3) Umbeck's theory of force. Demsetz's theory of property rights emphasises the role of new

economic opportunities or economic growth in an institutional change. The interest group theory emphasises the role of the political or equity factors in an institutional change. Finally, Umbeck's theory explains why the political power and the equity factors are important in modelling an institutional change.

2. To develop a theoretical framework that explains the process of an institutional change in the ownership of natural resources, under the constraint of force. The framework involves an extension of Umbeck's theory (1989) of the formation and the initial distribution of property rights.
3. To evaluate this framework using the historical experience of the settlement of the Ontario peninsula.

1.5 OUTLINE

The thesis consists of six chapters. Chapter one is an introductory chapter that defines the economic research problem, purpose and objectives of the thesis. Chapter two reviews three theories that explain property rights emergence and change, and the entailed distribution of wealth. Chapter three models the allocation of ownership rights to fisheries under the constraint of force. The model is based on Umbeck's theory of force. Chapter four empirically tests Umbeck's theory. The test is based on the history of the settlement of the Bruce Peninsula. Chapter five tests whether Umbeck's theory is consistent with the current restitution of land and resources to the Native people. Chapter six is the conclusion chapter where a summary of the thesis and the policy implications are given.

CHAPTER TWO

THE CONVENTIONAL VIEWS OF INSTITUTIONAL CHANGE

2.1 INTRODUCTION

North (1990) defined institutions as formal and informal rules that constrain individual behaviour and shape human interaction. Informal rules include, among others, convictions, ideologies and dogmas. "Formal rules include political (and judicial) rules, economic rules, and contracts...Political rules broadly define the hierarchical structure of the polity, its basic decision structure, and the explicit characteristics of agenda control. Economic rules define property rights, that is the bundle of rights over the use and the income to be derived from property and the ability to alienate an asset or a resource (North, 1990)." Adopting the definition above, institutional change in this thesis refers to the change in the economic rules that define property rights. It refers to a change in the assignment of ownership of valuable assets; a change in the designation of who bears the rewards and costs of resource-use decisions; and a change of the actors in the economic system.

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As mentioned each of the four theories determines the nature of property rights and the desirability or the permissibility of an institutional change; however, these theories do not analyse how, actually, the various property rights institutions, including an institutional change, emerge. Does an institutional change emerge to respond to an opportunity of social wealth maximisation or to an opportunity of an interest group wealth maximisation? What are the variables that determine the nature and the timing of the observed institutional changes? This chapter will review the theories that predict the emergence or the change in the institutions. The reviewed theories are 1) Demsetz's theory of property rights, 2) interest group theory and 3) Umbeck's theory of force.

2.2 DEMSETZ'S THEORY OF PROPERTY RIGHTS

Demsetz's theory of property rights correlates the emergence of property rights to the emergence of new or different beneficial and harmful effects. The theory maintains that a property right system will emerge or change towards an increase in the internalisation of an externality, or towards the maximisation of wealth. The conceptual foundations of the property rights theory are set in Demsetz's, 1967, paper "Towards a Theory of Property Rights". Demsetz contends that "[p]roperty rights develop to internalise externalities when the gains of internalisation become larger than the cost of internalisation. Increased internalisation, in the main, results from changes in economic values, changes which stem from the development of new technology and the opening of new markets, changes to which old property rights are poorly attuned." As empirical evidence, Demsetz argues that the advent of the fur trade, in the eastern part of Canada, increased the value of the fur-bearing

animals: the externality of over hunting was worth taking into account. "The property system began to change and it changed specifically in the direction required to take account of the economic effects made important by the fur trade (Demsetz. 1967)." Exclusive rights to take beaver on well-delineated hunting grounds developed to provide incentives to reduce the depletion of the animal. Exclusive rights would appropriate the future returns to investment made in the form of a reduction of current harvests of beaver to the property right holder. Thus, such conservation investment that will maximise the present value of the fur-bearing animals will be undertaken. Demsetz confirms his theory by pointing to the absence of property to plains animals among the Indians of the south-western plains. In the Southwest, there were no animals of commercial importance as the beavers. Moreover, most of the plains animals were grazing species that wandered over wide tracts of land. "Hence both the value and cost of establishing private hunting lands in the Southwest are such that we would expect little development along these lines. The externality was not worth taking into account (Demsetz, 1967)."

North and Thomas (1972) used the property rights theory to explain the "First Economic Revolution" or the Neolithic Revolution, 10,000 years ago. The driving force in their model is population pressure. They claim "[w]hile animals and plants remained abundant relative to the demands of the human population, there was no incentive to incur the costs of establishing property rights over them. It is only during this transitional phase of increasing scarcity that it became worthwhile for man to incur the costs necessary to develop and enforce property rights that could limit the rate at which the resources were exploited (North and Thomas, 1972)." According to North and Thomas, the prehistoric man had an unconstrained access to the natural resources whether animals to be hunted or vegetation to

be gathered. Thus. he or his band "has the incentive to exploit the resource to the point where the value of the last animal killed or the last measure of grain gathered is equal to the private costs of killing or gathering it. The collection will continue until all of the income the scarce resource would have earned under private property rights is dissipated." The end result is over exploitation of the resource base to the point of depletion or scarcity. Population expansion further increases the diminishing returns in the produce of labour in hunting/gathering. "The solution to the common property dilemma in which prehistoric man found himself was the development of exclusive communal property rights (North and Thomas, 1972)." The transition from an open access regime to a private property regime or the transition from gathering/hunting to agriculture "occurred as a result of persistent population pressure which produced changes in relative scarcities of the resource exploited by the prehistoric man." However, the thrust of North and Thomas paper is that: "The first economic revolution was not a revolution because it shifted man's major economic activity from hunting and gathering to settled agriculture. It was a revolution because the transition created an incentive change for mankind of fundamental proportions. The incentive change stems from the different property rights under the two systems. An open access property rights over resources provides little incentive for the acquisition of superior technology and learning. In contrast, exclusive property rights which reward the owners provide a direct incentive to improve efficiency and productivity, or, in more fundamental terms, to acquire more knowledge and new techniques. It is this change in incentive that explains the rapid progress made by mankind in the last 10,000 years in contrast to his slow development during the long era as a primitive hunter/gatherer."

Anderson and Hill (1975) provided a graphic model of Demsetz's theory (Figure 2.1).

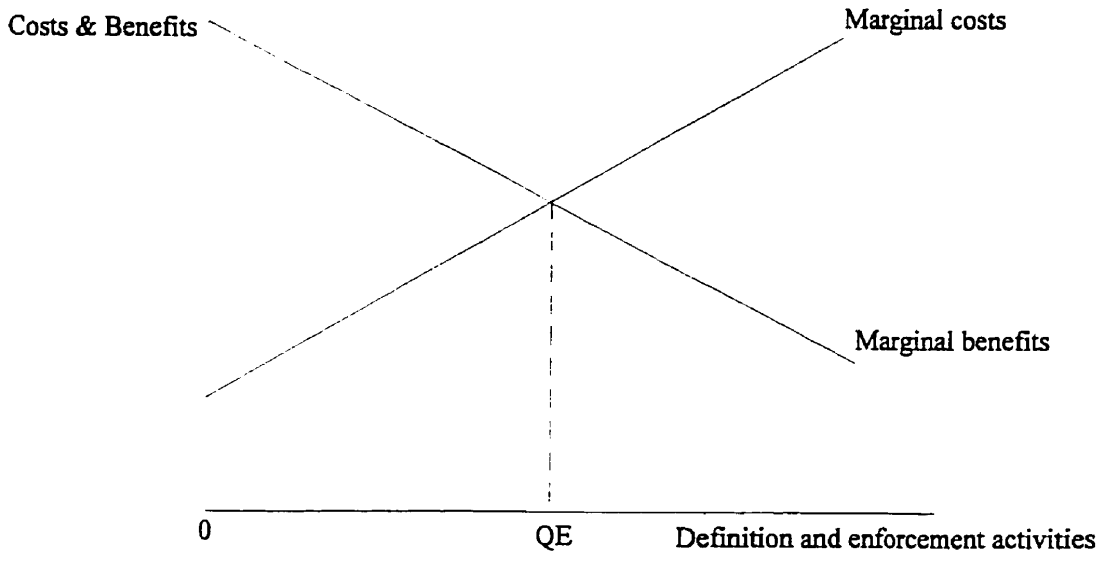

Figure 2.1 Equilibrium quantity of exclusion activity

The graphic model involves a marginal cost function and a marginal benefit function for an increase in the delineation and enforcement of property rights. Applying Demsetz's theory of property rights, an increase in the value of an asset or an increase in the probability of encroachment by outsiders will shift the marginal benefit curve upwards; therefore, the property rights to that asset will be further delineated and more exclusive. Similarly, a fall in the cost of exclusion will shift the marginal cost curve downward, increasing the level of definition and enforcement of property rights.

Leuck (1989) used the property rights theory to explain or examine the economic forces underlying wildlife laws in the United States and in the United Kingdom. He invoked the same factors as Demesetz (1967), value of wildlife and the cost of managing roaming species, when explaining the split ownership of wildlife among federal, state and private authorities. "...The assignment of rights to wildlife stocks will depend on wildlife values and landowners' contracting costs, so the laws should vary as the net gains from different legal rules vary (Leuck, 1989)." Leuck found a strong correlation between types of ownership -federal, state and private- and geographic dispersion of the wild species. Stocks that migrate across continents or states are more likely to be controlled by the federal government on national and international levels. Non-migratory stocks or stocks with territories that do not overlap with states boundaries are controlled by the local government or private parties. For example, where landowners' contracting costs are small, private landowners control hunting and fishing rights, as in the cases of private fishponds or game on farms. In sum, Demsetz's theory of property rights views the origin of an institutional change as maximising decisions to economise on transaction costs. The theory does not take into account the competition among the resource users for the range of

economic opportunities made possible by changes in property rights. "The competition for resources rents and the political agreements made to resolve disputes over them lead to property rights institutions that would be difficult to explain without an analysis of the political contracting underlying them (Libecap, 1989)."

2.3 INTEREST GROUP THEORY OF PROPERTY RIGHTS

The analytical framework of the interest-group theory "focuses on the political bargaining or contracting underlying the establishment or change of property institutions, and it examines the motives and political power of the various parties involved Libecap (1989)." Libecap (1989) justifies this approach by maintaining that "ownership structures are politically determined, and they assign both wealth and political power in a society....The stand taken by influential parties and the concessions made to reach political agreement on the allocation and definition of rights critically fashion the institutions that are adopted at any time, (Libecap 1989)."

The adjustment of property rights in response to shifts in relative prices or changes in production and enforcement technology is not predetermined towards additional definition and enforcement of property rights to more valuable assets. The adjustment is a function of 1) wealth, size and homogeneity of the various competitors over the resource, 2) the legal precedents, 3) distributional norms and 4) the individual expectations regarding the use of the political process to assign property rights. The greater the size and wealth of an interest group, the greater is the political force of its demand in obtaining a more beneficial definition of its rights or in maintaining the status quo. Its size

and wealth "may be sufficient to attract a favourable response from vote-maximising politicians and from bureaucrats who are concerned with maintaining administrative or regulatory mandates and budget appropriations (Libecap, 1989)." However, the more heterogeneous are the bargaining parties the more difficult it will be to form winning political coalitions and a consensus on adjustment and re-assigning of property rights. Finally, prevailing distributional expectations and established precedents determine the political costs for the politicians enacting legislation in response to new common pool problems. Adjustments in property rights that violate these two factors place the tenure for the politicians responsible at risk and are likely to be rejected by the courts.

Johnson and Libecap (1982) cite a number of examples where the private territorial rights to fisheries have been eliminated in response to distributional norms and egalitarian pressures. Federal and state courts in the United States have repeatedly emphasised the rights of all citizens to access fisheries and other wildlife (Johnson and Libecap, 1982). They have even outlawed regulatory schemes that discriminate against out of state residents. Moreover, fishermen's union and trade associations that control entry and fix prices are opposed by the Justice Department and the Federal Trade Commission as violations of the Sherman Act, although these unions ultimately enforce conservation measures (Johnson and Libecap, 1982). An example would be the case of the Gulf Coast Shrimpers and Oysters Association. This association controlled and fixed the prices of the size classes of shrimp. The minimum price per pound for the smaller shrimp size was set by the Association above the market price while the price for large size was set below the market price. In the market, the price for a pound of larger shrimp was at least double that for smaller shrimp. The direct objective of the Association price fixing was to increase the

value of the total catch of fishermen by directing effort toward larger more valuable shrimp. However, this price fixing was ultimately an effective conservation measure. For it reduced the demand for small shrimp by the packers. The catches of immature shrimp decreased thereby increasing the yield of higher-valued, larger shrimp later in the season. However, despite its important role in conservation, the Association was denied by the courts a union status. The verdict was: "A co-operative association of boat owners is not freed from the restrictive provisions of the Sherman Anti-trust Act, section 1-7 of this title, because it professes, in the interest of the conservation of important food fish, to regulate the price and the manner of taking fish unauthorised by legislation and uncontrolled by proper authority (15 USA Sec.522, Johnson and Libecap, 1982, p.1008).

An empirical example where distributional norms and pressure from influential groups superseded the efficiency issues entailed by further defining property rights is provided in the economic history of the Washington salmon fishery (Higgs, 1982). The fish wheel in Oregon waters and the traps in the Puget Sound represented a form of private property rights to fishing sites. A trap license allows its holder to the "exclusive rights to hold, occupy and fish such location, to renew the license therefor, and to mortgage, sell and transfer the same (Higgs, 1982)." The fish wheels and traps are referred to as terminal gears as opposed to the drift gillnets and seines that are described as intercepting gear. Terminal gear is often the least costly way of capturing the salmon since they merely catch returning runs in narrow passages. The use of intercepting gear imposes socially unnecessary costs on the fishery for they often require higher costs to search and capture more dispersed salmon stocks. Higgs (1982) argues that: "Fishery managers concerned about social efficiency would attempt to discourage mixed gear, given a choice, they

would favour gear in proportion to its "terminality" and strive to obstruct new modes of interception." However, the state's property system encouraged and promoted the use of mixed gear. Ultimately, the state outlawed the use of terminal gears. Higgs (1982) explains: fishery managers behaved in this way "either because they do not consider social efficiency at all or because they place higher priority on other objectives with which social efficiency conflicts." Effectively, the abolishment of private property rights associated with a technical regress from high productivity gears to low productivity gears responded to pressure from influential political groups: sport fishermen and fishermen operating intercepting gears. The high productivity of terminal gears irritated and provoked the hostility of these interest groups.

a) The Abolishment of Fish Wheels in Oregon

On the Columbia River, the legislatures of Washington and Oregon started to regulate the commercial fishing season and gear in the 1870's (Higgs, 1982). Although the men operating intercepting gears downstream outnumbered and captured more salmon than the fish wheel operating upstream, the laws discriminated against operators of fixed gear. Higher licence fees were imposed on fixed appliances along with operational restrictions and catch taxes. These discriminations responded to the crisis that resided in the fact that two families shared the rewards of a highly efficient capital intensive business while a mass number of gillnetters shared the output of a low production labour intensive technique. The ultimate radical distributive measure was the initiative law passed in 1926 to outlaw all fish wheels in Oregon waters and all beach seines and traps on the Oregon

side of the Columbia above the Cascades (Higgs, 1982).

This law abolished long-established private property rights and highly productive gears for harvesting salmon. Donaldson and Cramer (1971) wrote: "The long-drawn-out "fishwheel fight" on the Columbia was not fought for conservation. Rather, the compelling reasons were economic, each side striving to catch as many fish as possible, with the low-cost production on the Upper river being particularly irritating to the lower-river operators." Outlawing the Oregon wheels did not improve on the overfishing condition of the river; Total harvest of salmon remained the same (Higgs, 1982).

b) Abolition of Traps in Puget Sound

The political effects on the regulations of the salmon fishery were more pronounced in the Puget Sound. After the Great Depression, social preferences opted for labour-intensive techniques of production rather than labour-saving ones. This preference was coloured with a heightened sympathy towards the poor and hostility towards the rich. Overlapping this social trend was a renewed concern for the conservation of natural resources. Thus, public opinion was inclined to point to trap operators and the canneries as the culprits in overfishing and to embrace the cause of the poor net fishermen fighting against the rich big businesses. The advent of sport fishermen in the political scene played an important and conclusive part in outlawing traps. Sport fishing was regarded as an industry worthy of protection and encouragement since it provided employment to thousands that catered to the need of sport fishermen. The latter effectively crusaded against the trap fishing, perceiving it as a direct threat to their enjoyment. Operating during

the day, the traps were a flagrant sight, to the sport fishermen, of their effectiveness in scooping salmon. In contrast, operating during the night, the gillnetters and purse seiners were less visible thus constituted less of a perceived threat. "As usual, the limited and biased evidence of immediate experience received more weight than the systematic data available, which showed that the purse seiners caught more of the salmon (Washington State, Fishery *Reports*, 1936)." As to the sport fishermen's motives and impact on the fishery, Higgs (1982) described them as: "Although they liked to think of themselves as noble and public-spirited citizens campaigning against greed and the destruction of nature's bounty, the sportsmen were simply a special interest group, as grasping as the next." In this biased political environment, the initiative No.77, outlawing traps in the Puget Sound, was passed. Higgs (1982) estimated the direct loss of confiscating the private property rights at, at least, $3 millions in 1933 prices. For this confiscation entailed the complete loss of market value of the owners' investments in stationary fishing gear along with the destruction of the value their fishing sites. In 1933 prices, the value of the investment in all fixed gears was $1,586,372 (Washington State, Fishery *Reports*, 1936). As to the value of the fishing sites it was estimated, in 1933 prices, at $686,000, assuming the value of $1,000 to each of the 686 licences of operating fixed appliances outlawed by No.77 (Washington State, Fishery *Reports*, 1936). Thus, the total loss that Higgs (1982) realistically rounded to $3 millions is $2,272,372, in 1933 prices.

The social cost, associated with the operation of the society at a point inside its production possibility frontier in harvesting salmon, is at least, $1,224,000 in 1937 prices. In 1937, the legal mobile gear comprised of 1,111 gillnets, 213 purse seines, 395 troll units, 49 reef nets and an assortment of minor gear, caught about 7.6 million of salmon

inside Washington's jurisdiction (Washington State, Fishery *Reports*, 1939). "If fixed gear had been permitted and mobile gear eliminated in 1937, then, assuming only an average harvest of 37,000 fish per unit of fixed gear, 205 units of fixed gear could have taken the same number of fish that were actually taken by the assorted mobile gear (Higgs, 1982)." Assuming 1937 prices, to operate the total fleet of mobile gear, i.e. capital and labour costs, costs at least $1,956,000 (Higgs, 1982). To operate 205 units of fixed gear could have cost at most $732,000 (Higgs, 1982)". Thus, the society could have saved at least $1,224,000 by outlawing the relatively unproductive gears rather than the relatively productive one.

The variation of the law in the Washington salmon fishery contradicts the wealth maximising hypothesis or Demsetz's theory of property rights. As the value of the Washington salmon industry increased, the fishery management laws or regulations evolved towards the abolition of private property rights and the outlawing of highly productive gear, i.e. traps and fish wheels. The net gains realised, in this example, conflict with net social gains. The gains make an "economic" sense only by identifying the specific gainers. Moreover, the argument that: "the formation and strength of interest group is likely to reflect the costs and values associated with resource use (Leuck, 1989)" fails to differentiate social costs and values from private costs and values.

The importance of distributional issues in the development of property rights is more prominent in the case of fishery regulations. Regulations are devised to increase the total harvest. However, they can decrease the allowable catch for some fishermen. Fishermen are heterogeneous in their ability to catch fish. Some fishermen are well adapted and more productive under an open access regime than other fishermen. This

heterogeneity makes the assumption of zero economic rents in open access fisheries true only for the case of marginal fishermen. The differential in rents, resulting from heterogeneous ability, affects the willingness of fishermen to organise with others or to lobby for specific regulations. To illustrate the difference in economic rents among more productive fishermen and less productive fishermen before and after regulations, Johnson and Libecap (1982) use the supply curve of fishermen effort. In Figure 2.2.a. the abscissa represents fishermen's input of effort. The *y* axis is the value of the marginal and average products of effort. This value is the same for all fishermen. However, the cost of supplying a unit of effort differs between a productive fisherman and a less productive fisherman. Thus, in Figure 2.2.a., after an arbitrary point H, the marginal cost of effort for good fishermen is less than that of less productive fishermen. Û represents the supply curve of effort for more productive fishermen that is the sum of the marginal costs for identical more productive fishermen. Ü is the supply curve of effort for less productive identical fishermen. The total supply of effort in the industry, i.e. Û plus Ü, is represented by $\Sigma_{i=1}^{2} U_i$ in Figure 2.2.b. MR_E and AR_E are, respectively, the marginal revenue and average revenue curves derived from the standard bionomic fishery model. In an open access regime, the total fishing effort is at E*. At this point, the corresponding value of the average catch per unit effort is equal to C_1. At C_1, good fishermen will earn a rent of C_1GHR. Less productive fishermen will earn a rent of C_1FHR, supplying an effort of $\ddot{e}_0$: a differential in rent equal to FGH. However, social rent maximisation requires a level of effort at E^{**} in Figure 2.2.b.

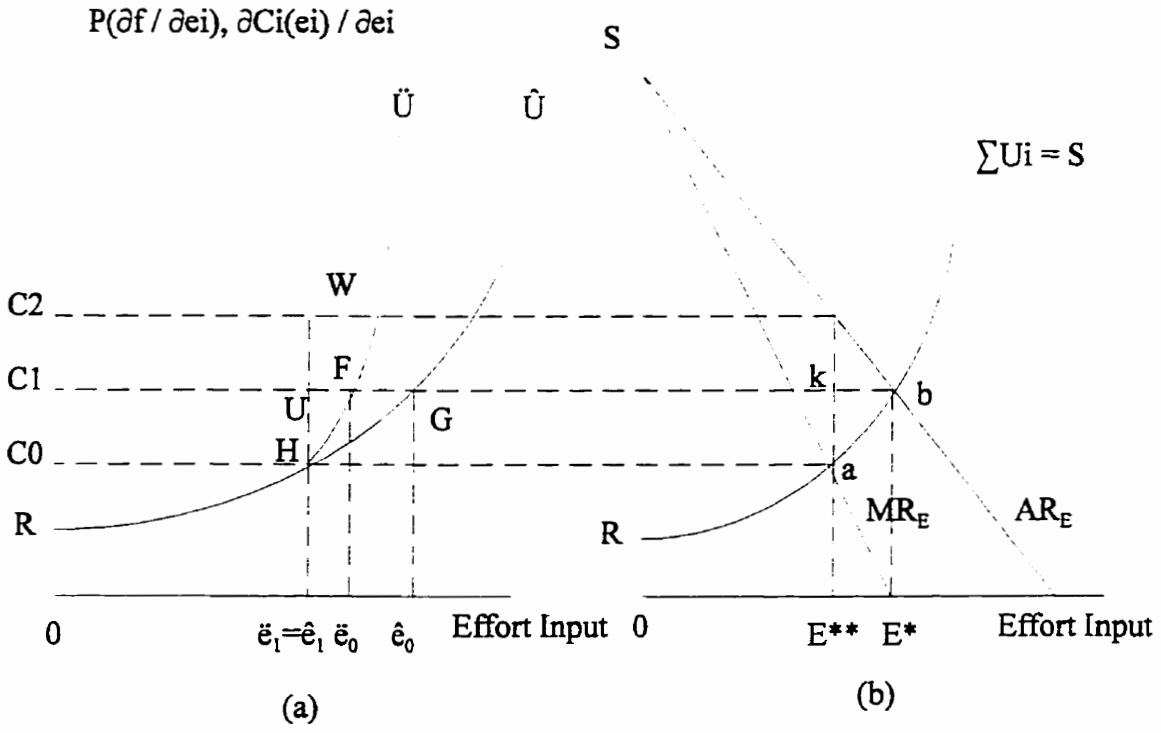

Figure 2.2 Quotas and Differential Rents

Assuming that equal effort quotas are imposed and that E^{**} is achieved at $\ddot{e}_1 = \hat{e}_1$, the net gains in rents is equal to abE^*, where:

$$abE^* = (C_2WUC_1 - UGH) + (C_2WUC_1 - UFH) \qquad (1)$$

The first term in the right side of equation (1) is the net gain or loss to more productive fishermen. The second term is related to less productive fishermen. Johnson and Libecap (1982) argue that, given that the supply curves slope arbitrarily beyond point H, the first term in equation (1) can be negative if the second term is sufficiently large to leave abE^* positive. This potential and perceived loss in rents points to the reluctance of fishermen to readily agree to individual quotas. The difficulties in regulating the fisheries do not pertain solely to the physical character of the resource. Disagreements on the ex-post distribution of wealth are major impediments to the formulation of a contract regulating fishery management.

Benson (1990) emphasises the point that the self-interest motives of government decision-makers must be recognised in the context of the interest groups theory where the government is the supplier of property rights change. Those in government have an incentive to reduce the power of other groups since those groups may threaten the sources of wealth for the government decision-makers (Benson, 1990). An illustrative case would be the analysis of the prevalence of federal ownership to western range lands in the United States of America. The invention of barbed wire in 1870 decreased drastically the costs of enforcement to range lands. The increase in population increased the competition over range lands: their value and scarcity increased accordingly (Anderson and Hill, 1982). However, contrary to the implications of the Demsetz's theory of property rights, private property rights to the ranges did not evolve. The grazing lands are managed as common

property where ranchers hold rights, as permits issued by the government, to graze livestock on the same range. One might explain the outcome by social preference to government ownership as opposed to private ownership. But, why the difference in preferences with regard to mineral lands that are privately owned? Both resources are non-fugitive.

Libecap (1981) identified the Department of Agriculture and the Department of Interior as the impediments and opponents to the development of private property rights to the western range lands. The Department of Interior was charged with the disposal of federal lands for homesteading. Although, the region was more suitable for livestock raising than for farming, the ranchers were unable to legally obtain more than the 160 acres allotted by the Homestead Act and similar land laws; Cattle raising requires 1,000 acres to achieve economies of scale (Libecap, 1981). Self-interested bureaucrats and officials of the General Land Office opposed the legal recognition of large land holdings to ranchers because this recognition will reduce the total number of claims to be verified and processed and will accelerate the process of land disposal. Thus, prospective budgets, salaries and long-term employment will be reduced. In short, the recognition will end the role of the General Land Office and its staffing needs. As for the Department of Agriculture, management of rangelands and timberlands in the National Forests was its main raison d'être. Granting of property rights to large tracts of range lands will annihilate its main reason to be. In sum, while ranchers, ultimately the society, will gain and maximise their wealth from privatising the range lands, government bureaucrats and officials will lose.

Finally, an interesting case that relates efficiency issues to distributional issues

raised by the interest groups theory is presented in Griffin's paper (1991). Griffin (1991) studied the effects of different property rules with their transaction costs on the welfare frontiers: the production possibilities frontier (PPF) and the grand utility possibilities frontier (GUPF). Traditional welfare frontiers do not reflect the amount of resources used for the generation of information or the amount of resources lost because of decisions made under imperfect information: they do not incorporate transaction costs. Once transaction costs are admitted, the traditional PPR and GUPF must be shifted inward according to the particular property rule adopted and its related amount and distribution of transaction costs. Figures 2.3, 2.4 and 2.5 are copied from Griffin (1991). They are used here to illustrate the above concepts. Figure 2.3 depicts a society's PPF for good X versus all other goods. The production of good X produces a detrimental externality on the production of all other goods. PPF is the traditional production possibility frontier. PPF_R is a property rule that entitles the society to be free from the detrimental externality. PPF_N entitles the producers of X to produce the externality while the society has the duty to endure. Both PPF_R and PPR_N lie strictly interior to the old frontier to indicate the amount of resources consumed in information generation. As depicted, a property rule R that assigns the burden of transaction costs to the producers of good X will cause a proportionately greater inward shift along the lower end of PPF. Under the R rule, large amount of bargaining and decision costs, that is resources, must be spent to have a larger production of good X. On the other hand, the N rule will favour a greater production of good X: the PPF will shift less inward along the X axis. Thus, each property rule will present a distinct welfare frontier. Furthermore, each property rule by underlying and distributing property rights will determine a specific initial endowment. This endowment

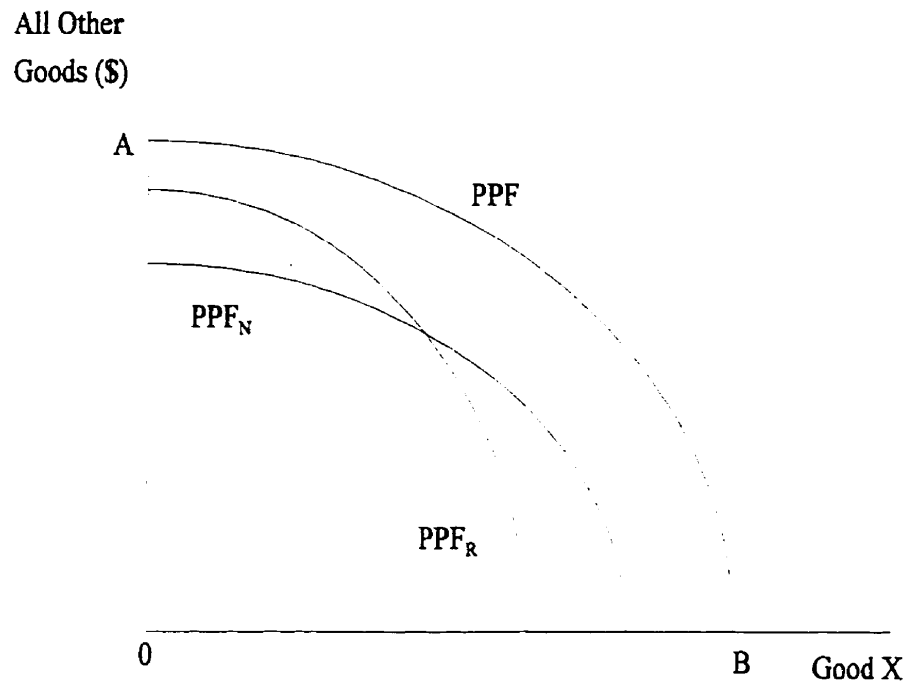

Figure 2.3 Production possibilities for the alternative property rules, R&N, with transaction costs

will, in turn, define a unique competitive equilibrium point.

In sum, a particular property rule will simultaneously determine the initial endowment (I_N: initial endowment under the N rule, or I_R: initial endowment under the N rule, Figure 2.4), the output vector (F under the R rule or G under the N rule, Figure 2.3) and finally the output distribution (points Q_N or Q_R, Figure 2.5) between the X-producers (denoted α) and all others (denoted β). Therefore, a choice between policy R and N boils down to a choice between the production vector Q_N and Q_R. Thus, whether group α or group β is to be favoured. Efficiency criterion cannot be used to choose between Q_R and Q_N; they are Pareto non-comparable. Griffin (1991) argued that "the choice itself is likely dominated by pre-existing social institutions constituting the fabric of mutual coercion." In the context of choosing the efficient property right to natural resource management, Griffin's (1991) argument is in line with Pearse's observation that: "The pattern of rights we observe seem less dependant on the physical characteristics of the resources than on the differing traditions of resource users, the historical sequence of resource development, and their scarcity and value, which provide the spur to innovation."

Samuel (1970) argued that the utility preferences of those in power will be made tangent to the production possibilities curve. The question is not an efficiency quest rather a question of "whose interests the state will be used to effectuate." This concept is investigated empirically by Rhodes and Wilson (1995). The authors studied the environmental conflict between the Mount Graham Red Squirrel (MGRS) and the Mount Graham International Observatory (MGIO). Both competed for the same habitat or location: Mount Graham. Under the National Environmental Policy Act (NEPA) the production possibilities frontier between astrophysical services and environmental services

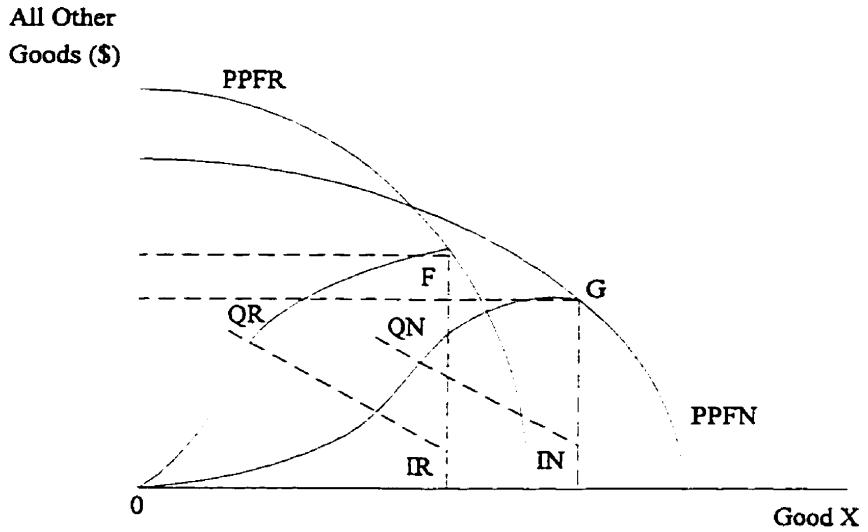

Figure 2.4 Equilibria for the alternative property rules, R & N, with transaction costs

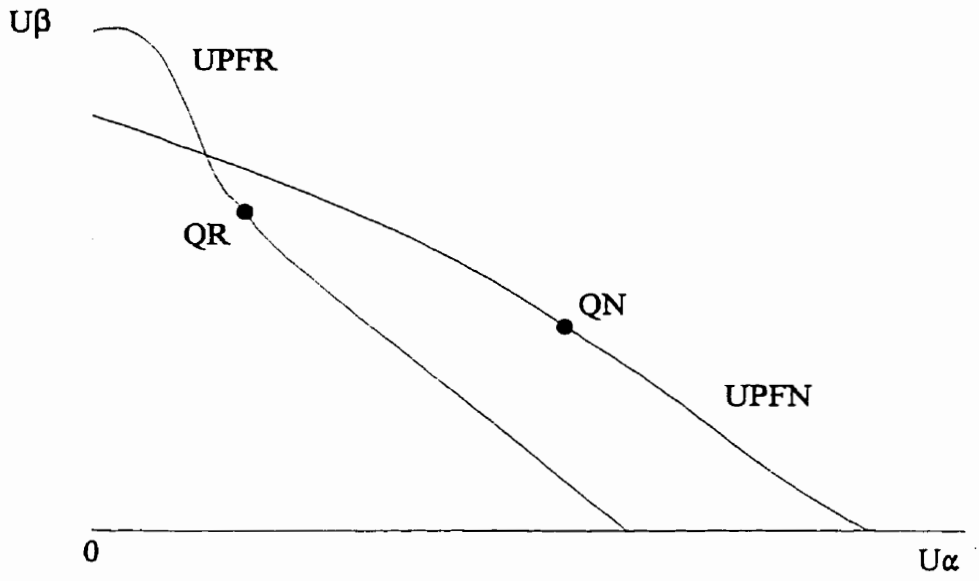

Figure 2.5 Equilibria in utility space for alternative property rules, R & N

is illustrated in Figure 2.6.

In 1987, the Mount Graham Red Squirrel was listed an endangered species. This listing granted the existence rights of the Mount Graham Red Squirrel an inalienable entitlement. This inalienable entitlement cannot be contested irrespective of any social or economic considerations. The impact of this institutional change is depicted by a shift in the production possibilities frontier towards the origin. Virtually, no astrophysical services will be allowed on the Mount Graham. The new PPF_{ESA} reflects the shift of the transaction costs onto the proponent of the observatory. However, the political power and effort of the University of Arizona, the "owner" of the observatory, succeeded in the Congressional enactment of Title VI of the Arizona-Idaho Conservation Act. This legislation authorises the construction of these telescopes with another four possible if NEPA and ESA standards are met. Thus, even with the endangered species listing, the political power and influence of the Mount Graham International Observatory proponent succeeded in changing once again the institutional framework. EFG_H is the new production possibilities frontier on the Mount Graham. The triangle gFh represents the litigation costs among the opponents and the proponents of the MGIO to reach the allocation F. Rhodes and Wilson (1995) concluded that, in this case,: "in natural resources conflicts endangered species, the interests of those with superior economic and political power can dominate [the] environmental decision."

2.3. UMBECK'S THEORY OF PROPERTY RIGHTS FORMATION

Umbeck presents his theory of force in his paper, 1981, "Might Makes Rights: A

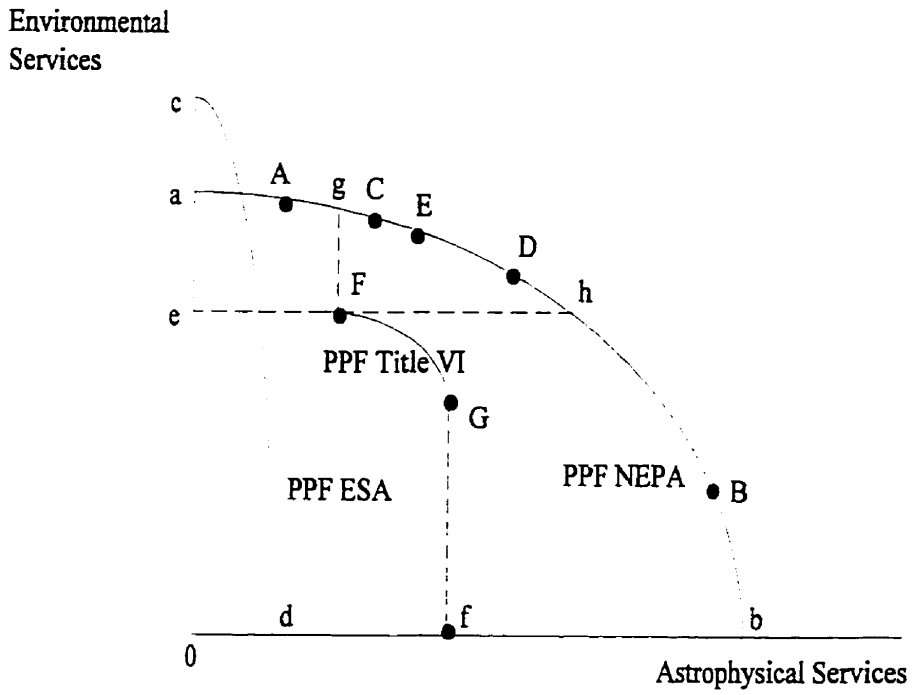

Figure 2.6 Production Possibilities for the Alternative Property Rights, ESA & NEPA

Theory of Property Rights Formation and Initial Distribution of Property Rights." The purpose of his paper is to "use the orthodox theory of competition to explain the formation and distribution of property rights among individuals. To this end, Umbeck (1981) uses the example of mining land as the scarce resource to be allocated.

The amount of mining land available is fixed at *OH* (Figure 2.7). The bargaining or competitive parties are miners. The miners are endowed with a fixed amount of labour time $\bar{U}$ that they allocate to mining. There are no work-leisure trade-offs. The relevant form of competition is the ability to use violence and the amount of labour time allocated to exclude other individuals. If two miners, *X* and *Y*, are equal in their ability to use force, any conflict over the resource ownership will be resolved according to the amount of labour time each allocates to fighting (Umbeck, 1981, p.41). If both miners allocate equal amount of time the outcome will be a draw. Similarly, if one miner is twice as proficient in the use of violence compared to another, he will have to use only half as much labour time as the other to achieve a draw. Finally, Umbeck assumes that each miner precisely knows how much violence the other is willing to use. Thus, a miner, knowing before hand he will lose, will give up the claim to the land without a fight; the model avoids the theoretical problems of strategic behaviour. With these assumptions Umbeck modelled the initial distribution of homogeneous mining lands and non-homogeneous ones under the constraint of violence, among miners with equal abilities to use force.

To determine the quantity of land that will be held by each miner at equilibrium, Umbeck (1981) graphs, in Figure 2.7, the marginal physical product of land and the marginal physical product of labour time in mining as a function of land to labour ratio, *h/L*. Umbeck (1981) assumes that both inputs display diminishing marginal returns. The

marginal physical productivity of labour, $\partial G/\partial L$, is plotted against the inverse to labour units, h/L. Thus, the curve is upward sloping, increasing with the inverse level of labour time in mining, irrespective of land level. Finally, since miners, X and Y, are, by assumption, homogeneous in their ability to mine and since land units are homogeneous in their gold production, $\partial G/\partial h$ and $\partial G/\partial L$, in Figure 2.7, are the same for both miners, X and Y.

If X were the only miner on the island, he would continue to acquire exclusive rights to additional land as long as the marginal physical product of land is greater than zero. In this present case, Umbeck (1981) assumes that land is scarce; It is scarce at a point before the marginal physical product of land is zero. Accordingly, X acquires the whole amount of land on the island, OH units of land. At this point, the marginal physical product of land and the marginal physical product of labour time are, respectively, HB and HA, Figure 2.7. The ratio HB/HA is, by definition, the rate of technical substitution of land to labour time (RTS (h for L)). Umbeck (1981) argues that this ratio "gives a measure of how much labour X is willing to allocate to maintain the exclusivity of his marginal unit of land. For example, if HB/HA equals 1/2, the maximum labour units X would use in violence to protect the Hth land unit would be 1/2 (Umbeck, 1981, pp.42)." In pure technical terms, RTS (h for L) means that one unit of land can be exchanged for 1/2 unit of labour time in mining in order to keep production constant.

Umbeck (1981) introduces in the scene miner Y. Miner Y starts with no land. Following Umbeck's interpretation of the marginal rate of technical substitution, HB/HA = 1/2, to exclude X from one unit of land, Y must be willing to spend at least 1/2 units of labour in violence. That is his marginal rate of technical substitution, RTS (h for L), must

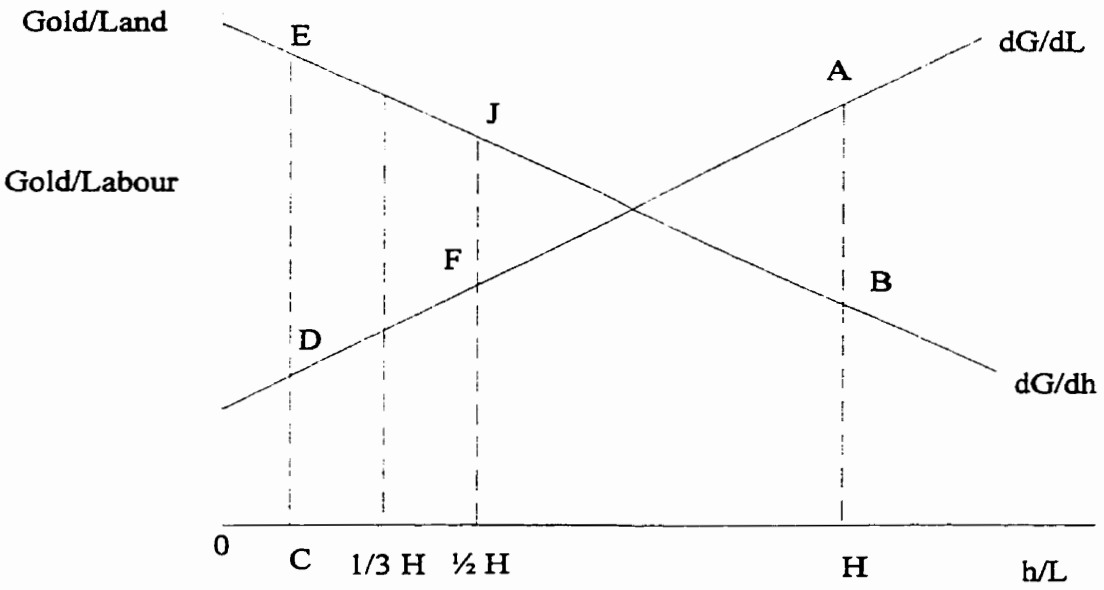

Figure 2.7 Distribution of homogeneous land under the constraint of violence

be larger than that of *X*'s. To *Y*, with no land, his first unit of land has a marginal physical product of *CE* in Figure 2.7. Correspondingly, his marginal physical product of labour is *CD*. *CE/CD* is greater than *HB/HA*. Accordingly, *Y* is willing to use more labour in fighting than *X* in the conflict over the marginal land unit. From the previous assumptions, *Y* will acquire his first unit of land. Moreover, no labour time is, effectively, spent in fighting, the mere threat of violence is sufficient.

At the end of the first round, both miners *X* and *Y*, still have $\bar{U}$ units of labour to allocate to gold production; labour was never used in the acquisition of exclusive mining rights. "However, as long as *Y* values an additional unit of land (in terms of labour) more than *X*, land rights will be transferred from *X* to *Y*. Equilibrium will occur when the land is distributed in such a way that the marginal rates of substitution between land and labour for both *X* and *Y* are equal. Given the assumptions, this will be at 1/2*H*, Figure 2.7, where the land is divided evenly between the two miners.

If a third identical miner, *Z*, arrives on the island, he would be in the same position as *Y* was in the last example. While, *X* and *Y* each have 1/2*H* land to mine. With no land, the rate of technical substitution of land to labour (*RTS* (*h* for *L*)) to *Z* is *CE/CD*. The former is greater than *HJ/HF*, the rate of technical substitution of land to labour to either miner *X* or *Y*, fig.1. Thus, *Z* will acquire his first unit. This process will continue until the miners have the same marginal rate of technical substitution. That is when each miner has 1/3*H* land, Figure 2.7.

Generalising to *N* homogeneous miners, the equilibrium occurs when each miner command 1/*N* units of land. "*The theory implies that the total amount of homogeneous mining land will always be divided evenly among the competing miners* (Umbeck, 1981)."

2.5. CONCLUSION

The three theories reviewed try to predict the way in which property rights arrangements respond over time to changing economic opportunities. Demsetz's property rights theory emphasises the role of new economic opportunities or economic growth in institutional change. While, the interest groups theory emphasises the role of political or equity factors in institutional change. Umbeck's theory explains why the political power and the equity factors are important in modelling institutional change. The theory draws a proportional relationship between distribution of power and distribution of wealth. Individuals with equal ability to use force will share equally the wealth or the increases in income that result from property rights and regulatory change. While the most forceful individuals will receive more wealth than those who are relatively weak.

However, Umbeck's model (1981) does not differentiate the labour time in mining and the labour time in fighting in the production function of gold. Labour time in fighting produces exclusivity over a unit of land. It does not produce or extract gold. In Chapter three, a model that uses the costs and benefits associated with acquiring/defending a fishery is developed. The model can be applied to other types of resources. The choice of a fishery is due mainly to the ease of graphical illustration of benefits and costs of acquiring/defending a resource.

CHAPTER THREE

THEORY OF THE FORMATION AND INITIAL DISTRIBUTION OF RIGHTS

3.1. INTRODUCTION

According to Umbeck (1981, pp.39), "ownership rights to property can exist only as long as other people agree to respect them or as long as the owner can forcefully exclude those who do not agree." Following the postulate of individual wealth maximisation, "if one person can violate the terms of the agreement and deprive another of his assigned rights he will do so if the gains exceed the costs (Umbeck, 1981, pp.39)." Even if an explicit agreement among individuals to assign and respect ownership rights exists, the threat of force or some enforcement measures will still be required.

In the same vein, Epstein (1993) points to the importance of the institutions of state enforcement in the flourishment and maturity of modern competitive markets.

"Competitive markets have enormous resilience, but they cannot sustain themselves against all forms of external shock. Within the framework of a secure state, many individual markets may develop customary norms and informal enforcement mechanisms within any given industry. Still, it is far cry to assume that the same process of voluntary co-ordination would take place with equal precision without the background institutions of state enforcement that allow these industry practices to mature and flourish. A pure system of private ordering cannot protect a system of voluntary, competitive, or even functioning markets (Epstein, 1993, pp.26)."

In sum, whether using personal force or the government enforcement powers, all ownership rights are in part sustained by the abilities of individuals or groups of individuals to forcefully maintain their ownership rights.

This chapter will model Umbeck's (1981) hypothesis of "Might Makes Rights." The first implication of the model is that the total amount of a homogeneous resource or wealth will always be divided evenly among competing individuals with equal abilities to use force. The second implication is that the most forceful individuals will acquire more wealth or a bigger share in a resource than those who are relatively weak.

The example of a region endowed with many fisheries will be used. Under the constraint of violence, the process of formation and distribution of property rights to the fisheries among competing fishermen will be modelled. In the model, each fishery consists of the area over which one type of fish, demersal fish[1], range; thus, the fisheries can be localised along the shore of one lake or separated in different lakes. The main assumption is that the fisheries are independent but homogeneous. The choice of demersal fisheries is consistent with the imposition of private property rights to the fishery.

The above objective in mind, section one will present the fishery model: the biological and technical aspects of a fishery. This model applies to all the fisheries in the region, since the fisheries are homogeneous by assumption. Section two will present the steps necessary to derive the profitable harvest level in one fishery. This level applies to the

remaining homogeneous fisheries. One fisherman, fisherman *A*, is assumed at the first stage to own and to manage the entire fisheries in the region. In Section three, a competing fisherman (a fisherman homogeneous to fisherman *A* in his ability to fish and to fight) enters into the model. The process of re-distributing the ownership to the homogeneous fisheries between these two fishermen will be derived, and the first implication of the theory will be discussed. Section four will model the process of the fisheries ownership distribution among fishermen with homogeneous ability to fish but different ability to fight: the second implication of the theory will be discussed. Section five is the conclusion to the chapter.

3.2. THE MODEL OF THE FISHERY: BIOLOGICAL AND TECHNICAL ASPECTS

A fishery consists of several different fishing purposes, mainly, commercial fishing and sport fishing. Each fishing purpose is characterised by the type of fish harvested and the type of vessels and gear it used. To simplify the analysis, the fishery under discussed in this thesis is a one-purpose fishery: commercial fishing. The fishery is harvested by homogeneous mesh nets.

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[1] "Demersal or groundfish are those that feed on ocean or lake bottoms and typically do not range over a wide area, such as lobster, crab, flounder and cod (Hartwick, 1986, pp.246)"

Since fish are living creatures, they have their own biological "production function": thus, to present the economic model of harvesting fish, it is important to present the basic biological model of the fishery.

3.2.1. FISH BIOLOGICAL "PRODUCTION FUNCTION"

The essential factors in the biological and economic models are stocks and flows. "The *stock* or population of fish is either the number of fish or biomass, the aggregate weight of the fish population measured at a point in time. The *flow* is the change in the stock over an interval of time, where the change results from biological factors, such as the entry of new fish into the population through birth (called recruitment), growth of existing members of the population, and natural death, and economic factors, such as harvesting the species (Hartwick, 1986, pp.247)."

It is typically assumed that the growth rate of a demersal fish stock depends on the population size or biomass. For a small stock size, food is abundant, so births tend to outnumber deaths, and the growth rate will increase. As the biomass or stock size increases, food per fish diminishes; deaths will begin to rise and the growth rate will decline. Ultimately, as the stock grows larger, deaths will equal births and the growth rate will fall to zero. Thus, for each stock of biomass X, there is a corresponding net increase over a small instant of time in the natural size of the population. This net increase in biomass is due to or equal to new fish entering the stock through birth; *plus* the physical growth of the existing

fish stock at each time *t: minus* the decrease in the biomass through natural mortality and predation.

Denoting *F (X)* as the instantaneous rate of growth of the fish biomass, the biological growth function for the fishery before any harvesting occurs. *F (X)* is equal to:

$$F(X) = dX/dt$$

The instantaneous biological rate of growth, *F (X)*, is often represented mathematically by the logistic function (Hartwick and Olwiler, 1986):

$$F(X) = rX(1-X/k)$$

Graphically, as shown in Figure 3.1, *F (X)* is a parabola when plotted against *X*, starting from a zero stock size. The variables *r* and *k* are parameters. *r* is the rate of growth of the stock when the stock is close to zero. This rate is called the intrinsic instantaneous growth rate. *k* is called the carrying capacity of the habitat. It is the maximum biomass the habitat can support. Starting with a small fish stock, the biomass *X* grows at first rapidly. Its growth reaches a maximum, *F (Xm)*, then declines to zero when the biomass reaches its carrying capacity, *F (k)=0* (Figure 3.1). At the carrying capacity, *k*, there is no net growth in fish

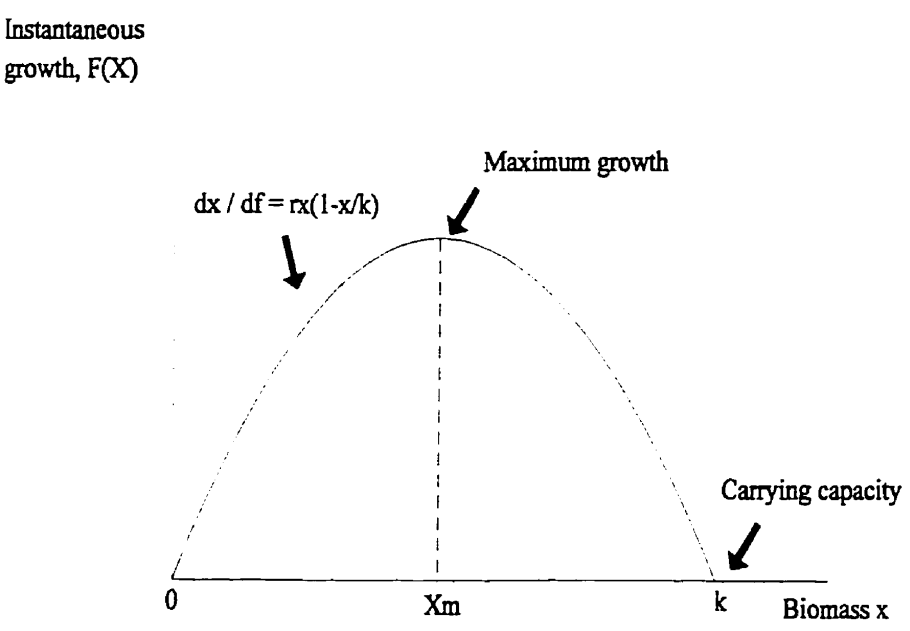


Figure 3.1 Logistic Growth Curve for Demersal Fish

population or biomass. $dX/dt=F(X)=0$; thus, the fishery is said to be in biological equilibrium.

3.2.2 BIONOMIC EQUILIBRIUM: BIOLOGICAL AND ECONOMIC EQUILIBRIUM COMBINED

Incorporating the economic activity of harvesting to the biological model, the relation between harvesting rates $H(t)$ and the change in the fish stock over a small interval of time, dX/dt, is:

$$dX/dt = F(X)-H(t)$$

The fish stock will be in equilibrium when $dX/dt=0$. That is the fish stock biomass will not change over time when its growth rate $F(X)$ is equal to the rate of harvest $H(t)$. This equilibrium is called a steady-state bionomic equilibrium.

In figure 3.2, an arbitrary instantaneous rate of harvest H_1 pinpoints two possible biomass equilibrium, X' and X''. H_1 intersects the fishery production function $F(X)$ at X' and X''. The level of the fish stock when harvesting started determines the biomass equilibrium point. If harvesting H_1 began when the stock was initially at k, the rate of harvest H_1 would exceed the fishery's biological rate of growth: $F(X)=0$; the stock biomass starts to decline till it reaches a value of X''. At this point, the natural growth rate equals the

Instantaneous
growth, F(X)

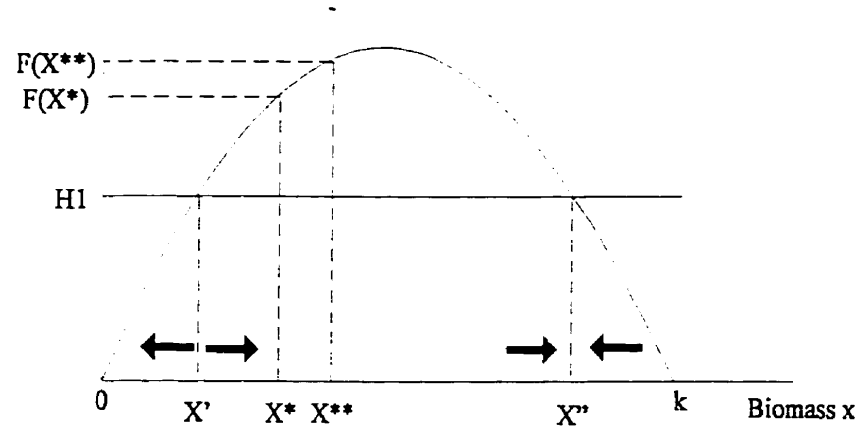


Figure 3.2 Steady-state Biomass Equilibrium

harvest: $F(X)=H_1$ and $dX/dt=0$; X'' is the steady-state bionomic equilibrium point, and H_1 is a sustainable yield.

If harvesting started at a stock level between X' and X'', the equilibrium is still at X''. At X^*, $F(X^*)$ exceeds H_1, the rate of harvest; the fish will grow in size by the difference between $F(X^*)$ and H_1, and the biomass will increase from X^* to X^{**}. At X^{**}, $F(X^{**})$ still exceeds H_1; the stock size will continue to increase. The process halts when $F(X'')$ equals H_1 at X'', and $dX/dt=0$. Again, the level of harvest H_1 is sustainable.

Finally, if the initial fish population were to the left of X', a continuous harvest rate of H_1 will extinguish the fish; existing species are captured before they have a chance to reproduce and to replenish the stock. A level $H_{1\,of}$ harvest cannot be sustained. Harvest will decline to zero with the fish stock.

3.3 ECONOMICS OF HARVESTING FISH IN ONE REPRESENTATIVE FISHERY

In deriving the bionomic equilibrium, no assumption was made about how the harvest rate $H(t)$ was chosen. In this section, the harvest level and the corresponding bionomic equilibrium will be determined based on the decision making of one economic agent: fisherman A, the owner of the fishery.

The process of determining the profitable and efficient level of effort to harvest a fishery is presented in steps. The first step is to determine the harvest function H and its

interaction between fishing effort E and the stock biomass X. The second step is to determine the total revenue and cost curves associated with the representative fishery. These curves are essential for the economic decision making. Finally, Fisherman A, based on the results from the first fishery and on his endowment of labour time, will decide how many homogeneous fisheries to appropriate in his region. In his decision making, I assume that he does not discount future harvests; he is indifferent between receiving a dollar today or a dollar tomorrow for his fish.

3.3.1. THE HARVEST FUNCTION.

Fisherman A has a harvest function $H(t)$ that indicates the output or level of harvest given the factors of production: fishing effort $E(t)$, and the stock of fish $X(t)$:

$$H(t) = G[E(t), X(t)]$$

"Effort can be thought of as some combination of the familiar inputs in economics-capital, labour, materials, and energy. These inputs are combined to yield an aggregate measure of effort-for example, man-hours per trawler over 50 feet in length, or seiner nets per person per trawler. In other words, effort is an *index* of factor inputs (Hartwick, 1986, pp.256)." In the case of fisherman A, effort is measured as the total number of mesh nets set.

The harvest function depends on the stock of fish at time t. With no fish in the stock,

none can be caught, and more fish will be caught with a given level of effort when the stock is larger. Mathematically, $H = G(0,X) = 0$ and $H = G(E, 0) = 0$.

The interaction between harvest H and effort E, keeping the stock of fish constant, is graphed in Figure 3.3. With a fish stock fixed at X, the harvest function is the curve $H = G(E, X)$. As more effort is added, the total harvest increases but at a decreasing rate. The marginal product of effort, G_E , displays diminishing marginal returns: $G_E > 0$ and $G_{EE} < 0$.

At a higher stock X', the harvest function is $H' = G(E,X')$. For each unit of effort there is a greater harvest. For a given level of effort, E_0, the harvest H' associated with X' is larger than the harvest H associated with X.

Finally, the interaction between harvest, H, and the fish stock biomass, X, keeping effort, E, constant is graphed in Figure 3.4. The interaction is determined by assuming that the harvest function, $H = G(E,X)$, is an increasing linear function in X. A given amount of effort, E, will yield a larger harvest, the larger the fish population is. At X', the harvest is $X'A$, and at X'' the harvest is $X''B$; $X' < X''$ and $X'A < X''B$. However, a steady-state equilibrium occurs at the point where the population equals a biomass of X: $F(X) = H(t)$ or $dX/dt = 0$. In sum, with a constant effort E, the harvest of fish reaches a constant, H, and the fish biomass is maintained at X.

If effort increases from E to E', the harvest function pivots upward to H', Figure 3.5. H' intersects $F(X)$ at a fish stock level of X'. The sustained harvest is H'. Note, however that H' equals the harvest level, H, reached with a fishing effort of E and a biomass of X.

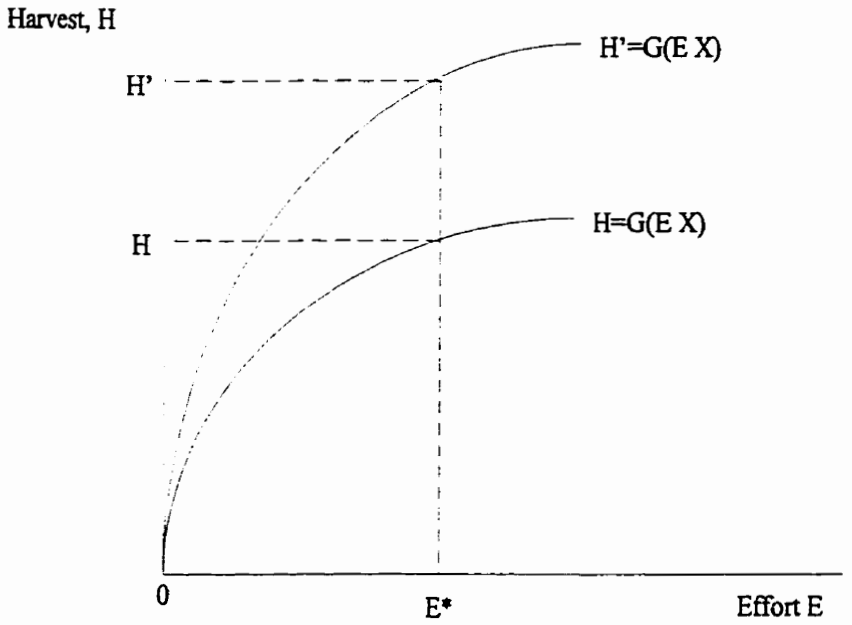


Figure 3.3 Interaction between harvest and fishing effort keeping fish biomass constant

F(X)

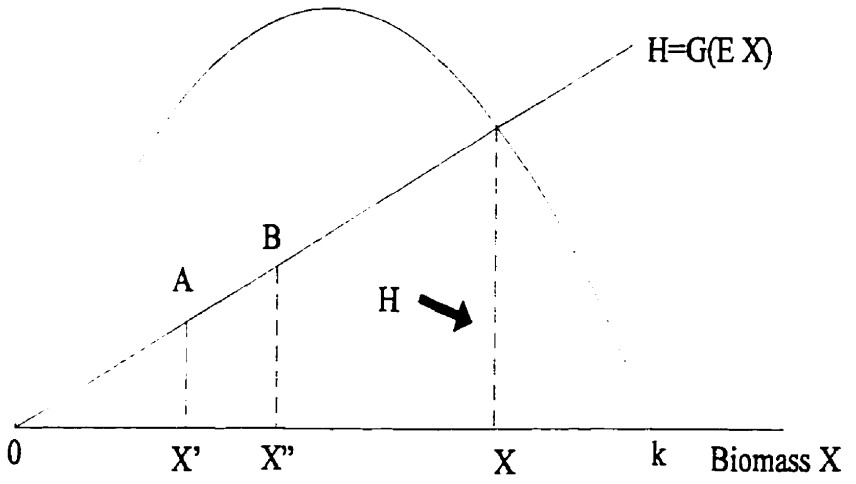


Figure 3.4 Steady-state harvests for given levels of effort as a function of the biomass

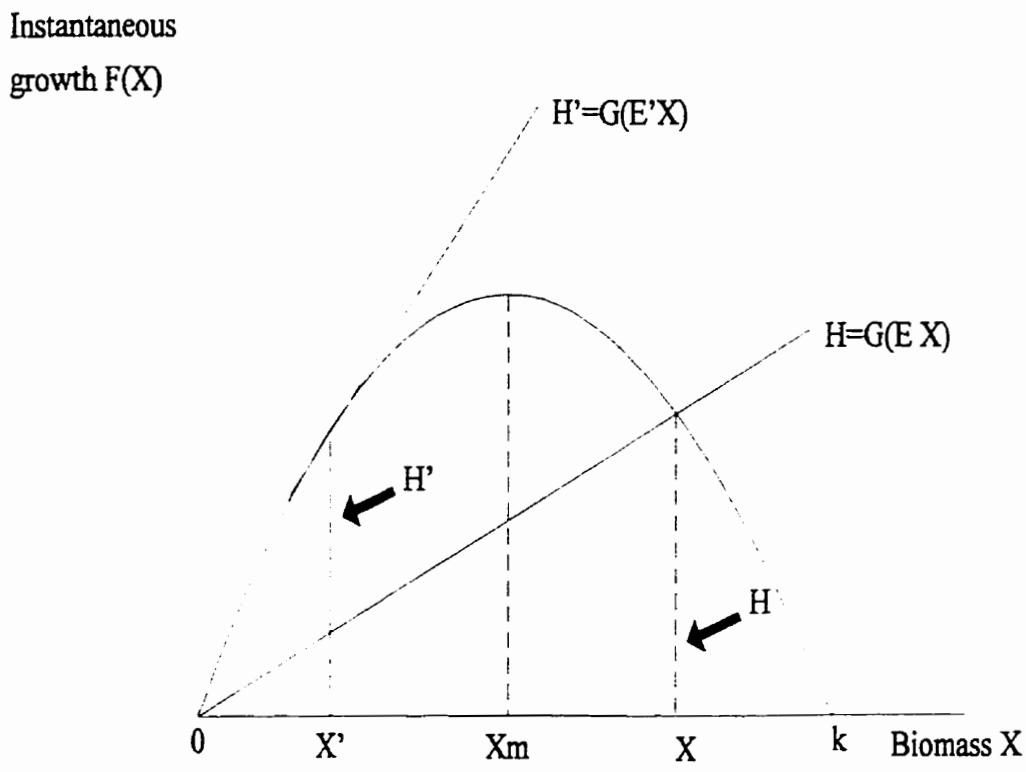


Figure 3.5 Effort increases from E to E', steady-state biomass decreases from X to X' but the harvest is at steady-state H=H'

It is inefficient, economically, for any fisherman to operate to the left of X''': More effort is needed to capture the same amount of fish.

3.3.2. FISHERIES TOTAL REVENUE AND COST CURVES

To determine the efficient level of sustained harvest, H, and the corresponding steady-state bionomic equilibrium, X, a fisherman must define the total revenues and total costs associated with his representative fishery.

Assuming that the unit cost of harvesting fish is constant, the total cost curve, TC, is linear with a slope c (Figure 3.6). The slope is the cost of a unit of effort that is measured by the number of mesh nets set. Total revenues, PH, are equal to the price of fish per pound, P, times the number of pounds harvested, H. For illustration, price is set at S1 per pound; thus, total revenues are determined by harvest function, $H = G[(E(t), X(t)]$:

$$TR = PH = H$$

Suppose fisherman A is the sole owner of the fishery. He starts to fish when the fishery is at a biomass of $X=k$; no fish have been harvested previously. As he starts deploying fishing effort, the stock of fish, X, falls. Harvest at first rises as the fisherman moves his effort along the biological production function (Figure 3.7). Harvest reaches a maximum at Xm; then falls again. Note that, thus, with $P=1$, the total revenue curve, PH, is

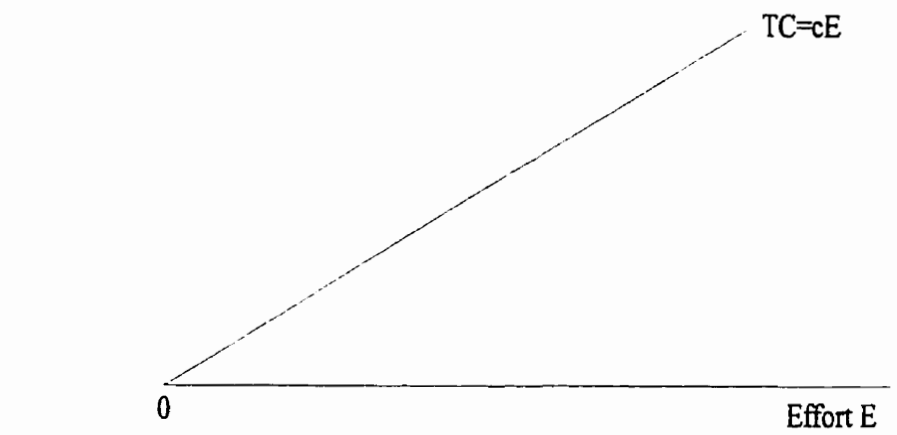


Figure 3.6 Total Cost Curve in a Representative Fishery

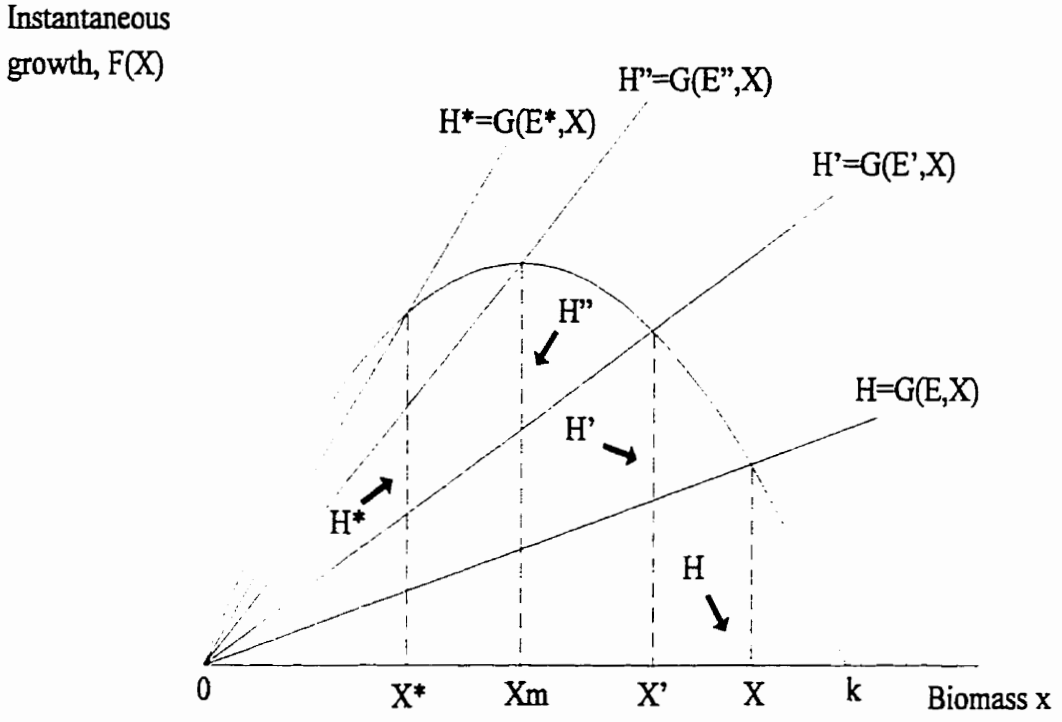


Figure 3.7 Harvest levels, H, as a Function of effort E

$

Total Revenue

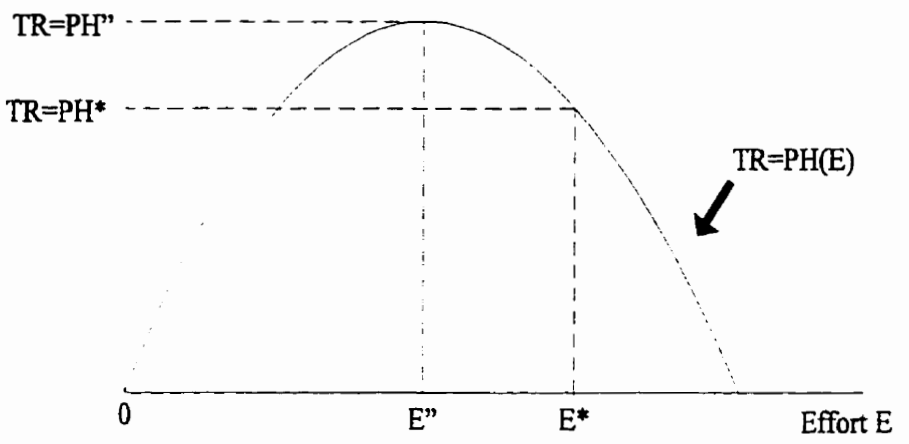


Figure 3.8 Total revenue as a function of effort E

exactly the same as the biological production function, $F(X)$; therefore, the total revenue curve as a function of effort. Figure 3.8 is derived from Figure 3.7.

3.3.3. PROFIT MAXIMISING LEVEL OF EFFORT

The profit maximising level of effort occurs where marginal cost equals marginal revenue. Figure 3.9.b presents the marginal revenue of effort, MR_E, and the marginal cost curve, $MC=c$. Both curves are derived from Figure 3.9.a. In Figure 3.9.b, the profit maximising level of effort is at E^*. For illustration, E^* is given the numerical value of six nets.

The total cost and the total revenue associated E^* are, respectively, $TC(E^*)$ and $MR(E^*)$ (Figure 3.9.a). Deploying an effort E^*, fisherman A would be earning a profit of ms, Figure 3.9.a., which is equivalent to the area abc, Figure 3.9.b. The final assumptions made before proceeding to describe the process of ownership distribution of the fisheries are 1) there are only 4 homogeneous fisheries in the region under study, 2) fishermen are endowed with a fixed endowment of labour time, in this example 12 hours. Labour time can be allocated either to fishing or to fighting. There are no work-leisure trade-offs. Finally, 3) to deploy the profit maximising level of effort, E^*, requires two hours, that is to cast and retrieve 6 meshes require two hours of labour time.

Thus, fisherman A will be able to appropriate the four fisheries in the region and he will be left with four hours of idle time (12-4*2). He will be fishing 2 hours in each fishery.

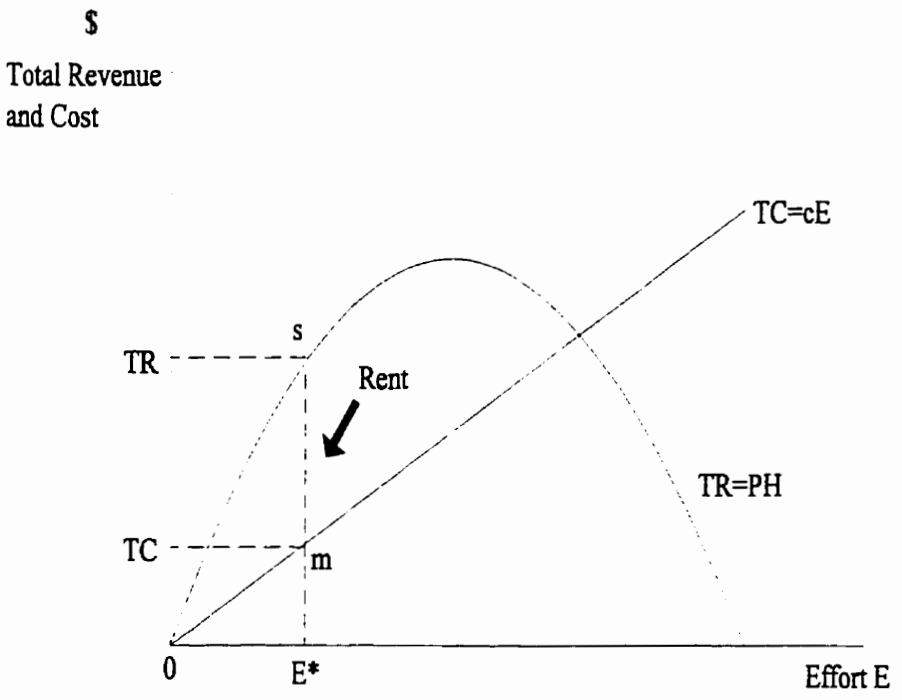


Figure 3.9a Total revenue and total cost of profit maximizing effort E*

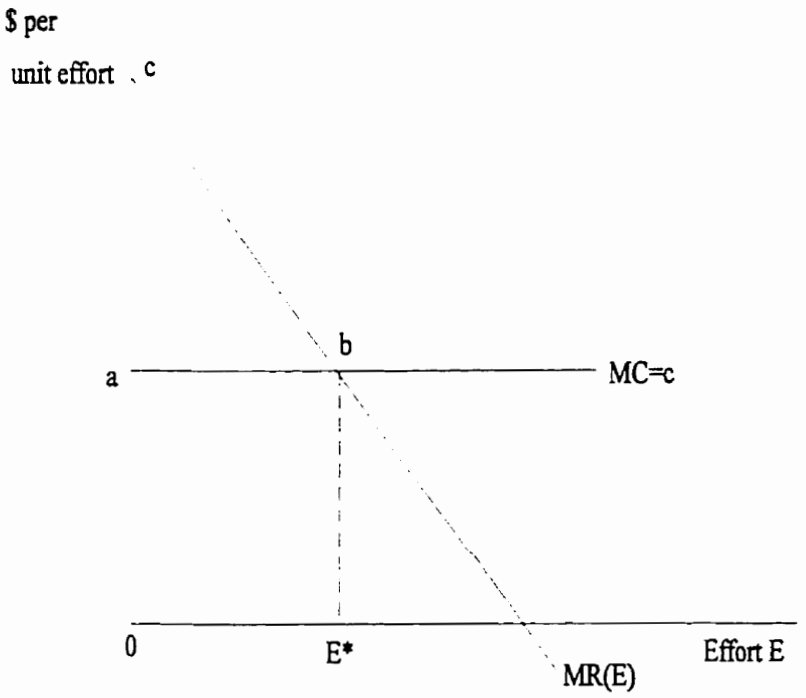


Figure 3.9b Determination of the profit maximization effort, MC=MR

His total profit or rent from the four appropriated fisheries is 4*(area *abc*), figure 3.9.b. or 4**ms*, figure 3.9.a.

3.4 ALLOCATION OF FISHERIES; EQUALLY FORCEFULL AND SKILLFULL FISHERMEN

Fisherman *B* arrives at fisherman's *A* region. Fisherman *B* is identical to fisherman *A* in his ability to fish and to fight: thus, *B* can manage the representative fishery in the same way *A* can. He can deploy the same required fishing effort in each fishery with the same amount of time; he casts and retrieves six nets in two hours.

However, *A* is controlling the whole four fisheries in the region; Fish is the only valuable and scarce resource around. Anarchy governs all the contractual relations between the two fishermen

3.4.1. ASSUMPTION OF ANARCHY

First, there is no government, laws or government enforcement of laws to constrain the behaviour of the fishermen as they pursue their own self-interest. Second, the costs of entering into any contractual arrangement to resolve the conflict over the right to cast nets are prohibitive. Violence is the only option a fisherman has to exclude others from the fishery. Violence or force is defined as the labour time allocated to fighting to prevent

another fisherman from harvesting a given fishery. The outcome of any competition between the two fishermen will depend on the amount of time each is willing to allocate to aggression and the ability to use force. For example, if the two fishermen are equal in their ability to use violence, any conflict between them will be resolved according to the amount of labour time each allocates to fighting. If they each allocate two units of labour time, the outcome will be a draw. If one uses more labour time, he will be the winner. Similarly, if one fisherman is twice as proficient in the use of violence compared to another, he will have to use only half as much labour time as the other to achieve a draw (Umbeck, 1981, pp.41). Third, the fishermen competing for rights to cast nets are fully informed about each other's abilities in fishing and fighting. Consequently, no labour is actually spent in the resolution of a conflict: No one will spend scarce labour time in fighting when the outcome is known in advance.

3.4.2. FISHERIES ALLOCATION PROCESS

Fisherman *B* owns no fishery. He can spend his fixed endowment of labour time, i.e. twelve hours, in fighting to acquire a claim on a fishery. He forgoes no rent from fishing if he chooses to do so. His opportunity cost of fighting is zero; however, his revenues are the rent of a potential fishery, area *abc*, Figure 3.9.b. Fisherman being a wealth maximizer will fight to acquire a fishery.

According to the form of competition specified above, fisherman *A* must spend twelve hours in fighting (the amount fisherman *B* is willing to spend) to keep and defend all the four fisheries. However, eight hours of his labour time are already spent in managing those fisheries; each fishery requiring two hours to manage, or E^* of fishing effort. At the end, he is left with only 4 hours (12-8) to spend defending his four fisheries. He must forgo the eight hours spent in fishing to match fisherman *B*'s bid on the fishery. For fisherman A, the opportunity cost of fighting is the total rent he earns from the four fisheries, 4**abc*, Figure 3.9.b. While, the marginal profit from his fourth fishery is *abc*, Figure 3.9.b. For fisherman *A*, the marginal cost of defending his fourth fishery is higher than its profit. Thus, he relinquishes fishery number four to fisherman *B*.

At the end of the first round, fisherman *B* is managing one fishery. He is spending two hours fishing and he is left with ten hours of idle time. The opportunity cost of his idle time is still zero. With no aversion to fighting, he can spend this time in fighting and acquire a second fishery. The return from his conquest is the rent that each fishery earns, *abc*, Figure 3.9.b. Once again, the gains of fighting are higher than the costs; therefore, fisherman *B* fights to acquire a second fishery.

At this point, fisherman *A* is managing the remaining three fisheries. He is spending a total of six hours fishing, each fishery requiring two hours. He is left with six hours of idle time (12-6). To match fisherman *B*'s bid of ten hours he must forgo four hours in fishing or forgo the total rent that two fisheries earn, 2**abc*. The marginal profit from his coveted

fishery is only *abc*. Again, the costs of defending his fishery are higher than the returns: fisherman *A* relinquishes a second fishery to fisherman *B*.

At the end of the second round, fisherman *B* is managing two fisheries. He is spending a total of four hours fishing and he is left with eight hours of idle time. He contemplates using this idle time in fighting for a third fishery. However, at this stage, fisherman *A* is managing two fisheries and is four hours fishing: thus, he is left with the same amount of labour time to fight, eight hours. At this point, neither fisherman has an incentive to acquire a third unit. To acquire/defend an additional unit means to forgo another one. The above process and calculations are summarised in table 1.A, 1.B and 1.C. As calculated in these tables, at the end of the second round, beginning of the third, both fishermen are managing equal number of fisheries. At this stage, an additional fishery presents the same cost and revenue for both fishermen. The opportunity cost of this additional unit equals its revenue, g=f=abc, for both fishermen, table 3.C.

To get around the non-divisible characteristic of the fishery resource, if two other fishermen, *V* and *W*, arrive at the region, equilibrium occurs when each of the four fishermen are managing equal amount of fisheries. That is when each fisherman is managing one fishery, 4 fisheries/4 fishermen. Thus, each fisherman is earning a rent of *abc*. The process of the re-distribution of ownership of the fisheries among the four fishermen is the same as described above.

TABLE 1.A. PROCESS OF ALLOCATION OF FISHERIES; EQUALLY FORCEFUL AND SKILFUL FISHERMAN, 1ST ROUND.

FIRST ROUND	Fisherman A	Fisherman B.
Number of fisheries owned. (a)	4	0
Total fishing labour time. (b=2*a)	8	0
Total time available for fighting. (c=12-b)	(d) 4	(e) 12
Amount of fishing time forgone. (f=d-e), or, fisheries forgone. (g=f/2), to match the highest fighting time	8 hours or 4 fisheries	0
Opportunity cost of fishing time forgone. (h=g*abc)	4*abc	0
Marginal revenue from the first disputed fishery, (k)	abc	abc
End result of the first round	***h>k, thus, A loses his 4th fishery***	***h<k, thus, B gains his first fishery***

TABLE 1.B. PROCESS OF ALLOCATION OF FISHERIES; EQUALLY FORCEFUL AND SKILFUL, 2nd ROUND

SECOND ROUND	Fisherman A	Fisherman B
Number of fisheries owned. (a)	3	1
Total fishing labour time. (b=2*a)	6	2
Total time available for fighting, (c=12-b)	(d) 6	(e) 10
Amount of fishing time forgone, (f=d-e), or, fisheries forgone, (g=f/2), to match the highest fighting time	4 hours or 2 fisheries	0
Opportunity cost of fishing time forgone, (h=g*abc)	2*abc	0
Marginal revenue from the first disputed fishery, (k)	abc	abc
End result of the first round	***h>k, thus, A loses his 3rd fishery***	***h<k, thus, B gains his second fishery***

TABLE 1.C. PROCESS OF ALLOCATION OF FISHERIES; EQUALLY FORCEFUL AND SKILLFUL FISHERMEN, 3rd ROUND

THIRD ROUND	Fisherman A	Fisherman B
Number of fisheries owned,(a)	2	2
Total fishing labour time. (b=2*a)	4	4
Total time available for fighting,(c=12-b)	8	8
Since both fishermen have equal amount of labour time to fight, the end result is a draw. In order for fisherman B or fisherman A to conquer a third fishery, one fisherman has to spend more time in fighting, e.g.10 hours. The table is completed if either fisherman B decides to acquire a third unit or if fisherman A decides to re-conquer his third unit.		
Total fighting time for the third unit, (d)	10	10
Fishing time forgone, e=12-d	2	2
Opportunity cost of fishing time forgone, f=(d/2)*abc	abc	abc
Marginal revenue from the third fishery, g	abc	abc
The end result: the gains earned are cancelled by costs incurred. No incentives for both A and B to acquire a third unit; Equilibrium		

Generalising to N homogeneous fishermen, the equilibrium occurs when each fisherman manages $1/N$ units of fishery. *The theory implies that the total amount of homogeneous fisheries will always be divided evenly among the competing fishermen.*

3.5. ALLOCATION OF FISHERIES; EQUALLY SKILLFUL, DIFFERENTLY FORCEFULL

Assuming that fisherman B is twice as proficient in the use of violence as fisherman A, fisherman B will have to use only half as much labour time in fighting to acquire a claim over a unit of fishery. Thus, an equilibrium point that distributes fisheries equally between the fishermen is not a stable one (Table 2.A, B, C, D).

As previously stated, fisherman A is the only fisherman in the region. He owns all the fisheries, the four of them. He spends 2 hours fishing in each fishery. He earns from each fishery the area *abc*. Figure 3.9.b. At the end of the day, after managing the four fisheries he is left with 4 hours of idle time. Fisherman B arrives at fisherman's A region. He is identical to fisherman A in his ability to fish but is twice as proficient in the use of force. Thus, in order to acquire/defend a claim on a fishery, fisherman A have to spend double the fighting time fisherman B is able to allocate.

Fisherman B owns no fishery. He can spend his fixed endowment of labour time, i.e. twelve hours, in fighting to acquire a claim on a fishery. He forgoes no rent from fishing if he chooses to do so. His opportunity cost of fighting is zero. However, his revenues are the

TABLE 2.A. PROCESS OF ALLOCATION OF FISHERIES; EQUALLY SKILLFUL DIFFERENTLY FORCEFUL, 1ST ROUND

FIRST ROUND	Fisherman A	Fisherman B
Number of fisheries owned. (a)	4	0
Total fishing labour time. (b=2*a)	8	0
Total time available for fighting. (c=12-b)	4	12 (d)
Fisherman B is twice as proficient in the use of violence as fisherman A. Thus. in order to acquire/defend a claim on a fishery, fisherman A have to spend double the fighting time fisherman B is able to allocate.		
Total fighting time required for fisherman A for defend/acquire a fishery. (e=2*d)	24	---
Fisherman A have to forgo fishing altogether		
Opportunity cost of fishing time forgone. (f)	4*abc	0
Marginal revenue from the first disputed fishery (g)	abc	abc
End result of the first round	***f>g, thus, A loses his 4th fishery***	***f<g, thus, B gains his 1st fishery***

Table 2.B. PROCESS OF ALLOCATION OF FISHERIES; EQUALLY SKILLFUL, DIFFERENTLY FORCEFUL, 2ND ROUND

SECOND ROUND	Fisherman A	Fisherman B
Number of fisheries owned, (a)	3	1
Total fishing labour time, (b=2*a)	6	2
Total time available for fighting, (c=12-b)	6	10 (d)
Fisherman B is twice as proficient in the use of violence as fisherman A; thus, in order to acquire a claim on a fishery, fisherman A have to spend double the fighting time fisherman B is able to allocate.		
Total fighting time required for fisherman A to defend/ acquire a fishery, (e=2*d)	20	---
Fisherman A have to forgo fishing altogether		
Opportunity cost of fishing time forgone, (f)	3*abc	0
Marginal revenue from the first disputed fishery (g)	abc	Abc
End result of the first round	***f>g; thus, A loses his 3rd fishery***	***f>g; thus, B gains his 2nd fishery***

TABLE 2.C. PROCESS OF ALLOCATION OF FISHERIES; EQUALLY SKILLFUL, DIFFERENTLY FORCEFULL, 3RD ROUND.

THIRD ROUND	Fisherman A	Fisherman B
Number of fisheries owned, (a)	2	2
Total fishing labour time, (b=2*a)	4	4
Total time available for fighting, (c=12-b)	8	8 (d)
Fisherman B is twice as proficient in the use of violence as fisherman A. Thus, in order to acquire/defend a claim on a fishery, fisherman A have to spend double the fighting time fisherman B is able to allocate.		
Total fighting time required for fisherman A for defend/acquire a fishery, (e=2*d)	16	---
Fisherman A have to forgo fishing altogether		
Opportunity cost of fishing time forgone, (f)	2*abc	0
Marginal revenue from the first disputed fishery (g)	abc	abc
End result of the first round	***f>g, thus, A loses his 2nd fishery***	***f<g, thus, B gains his 3rd fishery***

TABLE 2.D. PROCESS OF ALLOCATION OF FISHERIES; EQUALLY SKILLFUL, DIFFERENTLY FORCEFULL, FINAL ROUND.

FINAL ROUND	Fisherman A	Fisherman B
Number of fisheries owned. (a)	1	3
Total fishing labour time. (b=2*a)	2	6
Total time available for fighting, (c=12-b)	10	6 (d)
Fisherman B is twice as proficient in the use of violence as fisherman A. Thus, in order to acquire/defend a claim on a fishery, fisherman A have to spend double the fighting time fisherman B is able to allocate.		
Total fighting time required for fisherman A for defend/acquire a fishery, (e=2*d)	12	---
Fisherman A have to forgo fishing altogether		
Opportunity cost of fishing time forgone, (f)	abc	0
Marginal revenue from the first disputed fishery (g)	abc	abc
End result: Fisherman A must spend 12 hours just fighting for his last fishery: He must forgo fishing thus, not earn any rent. Pending on whether he likes fighting rather than being idle, he will either give up his last unit or keep on fighting for it.		

rent of a potential fishery, area *abc*, Figure 3.9.b. Fisherman being a wealth maximizer will fight to acquire a fishery.

Fisherman *A* must spend double the time fisherman B is allocating; he must spend 24 hours (12*2). However, he is only endowed with 12 hours of which eight are already spent in fishing; each fishery requires two hours to harvest, or E^* of fishing effort. Thus, at the end he is left with only four hours (12-8) to allocate to fighting. To match fisherman *B*'s bid on a fishery, fisherman *A* must forgo fishing altogether. Thus, according to the form of competition, fisherman *A* cannot afford his fourth fishery; therefore, he will relinquish it to fisherman *B*.

At the end of the first round, fisherman *B* is managing one fishery. He is spending two hours fishing and is left with ten hours of idle time. The opportunity cost of his idle time, or fighting, is still zero. With no aversion to fighting, he can spend this idle time in fighting and acquire his second fishery. Once again, the gains of fighting are higher than the costs. Fisherman *B* decides to acquire a second fishery.

Likewise, at the end of the first round, fisherman *A* is managing three fisheries after losing one to *B*. He is spending a total of six hours in fishing. He is left with six hours of idle time. To match fisherman *B*'s bid of ten hours, he must allocate 20 hours in fighting, 10*2. Thus, he must forgo fishing altogether. Once again, fisherman *A* cannot afford defending his third fishery. Fisherman *B* acquires his second fishery.

At the end of the second round, fisherman *B* is managing two fisheries. He is spending a total of four hours in fishing. He is left with eight hours of idle time. He

contemplates using this time in fighting for a third fishery. Fisherman A still cannot allocate sixteen hours (8*2) to defend the fishery that fisherman B is after. He loses his third fishery.

At the end of the third round, fisherman *A* is left with one fishery and fisherman *B* owns three fisheries. Fisherman B is left with six hours. Fisherman A, at this point, must be able to allocate 12 hours (6*2) in fighting to successfully keep his claim on his last unit. However, he is only left with ten hours of idle time after fishing in his last unit of fishery. Thus, he must forgo fishing. In the end, fisherman *A* will be spending 12 hours just fighting with no fishing; He will not earn any rent. Pending on whether he likes fighting rather than sitting idle, he will either give up his last unit or keep on fighting for it endlessly.

In either case, fisherman *B* is managing more fisheries and earning a higher rent than fisherman *A*. The relatively stronger have a bigger share in the resource management and ownership.

3.6. CONCLUSION

Based on Umbeck's theory, a model that describes the process of distribution of property rights to fisheries among competing fishermen is developed. Fishermen's revenue curve from the fisheries is presented. The revenue derived from one fishery is contrasted with the cost of defending/acquiring a fishery. It is shown that the equilibrium point in the allocation of rights to the fisheries is reached when the cost of defending/acquiring a fishery equals the revenue from that fishery. For fishermen with

different ability to use force the most forceful will have lower costs of acquiring or defending a fishery. This advantage will make the more forceful fisherman cost competitive, resulting in the takeover of a large share in the operating fisheries.

The implications of the model were 1) wealth is distributed equally only when the competing parties are equal in their ability to use force, 2) the most forceful party or individual will receive more wealth than those who are relatively weak.

CHAPTER FOUR

DISTRIBUTION OF POWER, CONTRACTS AND CONQUESTS OF LAND

4.1. INTRODUCTION

The whole history of Non-Native people settlement of North America can serve as a test for the hypothesis of force underlying the initial formation and maintenance of ownership rights. This thesis, however, focuses on a part of that history: the history of the Ontario Peninsula settlement. The Bruce Peninsula is a northwest protrusion from the Ontario Peninsula. The settlement of this protrusion is the continuation of the flood and flow of Non-Native people from the southeast of the parent peninsula: Ontario's.

The Native people, the Ojibway, are considered as fisherman A in chapter three the initial owners of the land or the resources in Ontario. Non-Native people are the new comers to the land. They contested, over the years, the Native people's ownership rights.

The Ojibway progressively lost their land to Non-Native governments through the treaty-making process. The treaties are considered as contracts where the Native people gave up claims they have on parcels of their land in exchange for the agreement that the Non-Native people will not exercise any claims on the land assigned to the Native. Initially, both parties held property with force. According to Umbeck's theory, the treaty agreed upon must distribute ownership rights in proportion to the distribution of power

between the bargaining parties: otherwise, there will be no agreement or no abiding by the treaty. A future increase in one party's ability to use force will offset the equilibrium point or the agreed upon distribution of ownership rights. A new contract or treaty is needed to re-distribute wealth according to the recent change in the relative power.

To test Umbeck's theory of force, this chapter must determine whether the consecutive treaty-writing process correspond to the consecutive change in the relative force between Native People and non-Native people. To this end, the rest of this chapter is divided into three sections. The first section is a background that presents the parties contracting for the ownership of the land and its resources. The second section describes chronologically the surrenders of the Natives' lands to the British Crown. As an empirical test to Umbeck's theory, this section is divided into three historical periods that correspond to a relative change in the non-Native power. In the first period, 1701-1783, the Ojibway were more powerful than the non-Natives; They were able to forcefully enforce their ownership rights to the land. Their initial victory in Pontiac's war, a war to repel British expansion, decreed their ownership rights to the land in the 1763 Royal Proclamation. The second period, 1783-1830, marks the defeat of the Ojibway in America; the disintegration of the Western Indian Confederacy and the settlement of the British Loyalists on the Ontario Peninsula. The third period, 1830-1889, corresponds to a massive influx of settlers into Ontario and to the transfer of the Natives from the charge of the Military authorities to that of the Civil Governors in both Provinces (Quebec and Upper Canada). The final section, section three, details the process of the abrogation of the native fishing rights.

Before proceeding, a definition of force or a scale of measurement is needed. The relative force between the non-Native people and the Ojibway and their Native allies can be measured by three indices. The first index is the proportion of Ojibway population to the population of non-natives in the Ontario Peninsula. In the eighteenth century, the population of the Native people was determined from the numbers of warriors, where the ratio of warrior count to total population varied from 1:3.5 to 1:6 (Norman, 1986); thus, the population number reasonably represent the military capacity of the Ojibway and their First Nation allies. As to the non-Native people, their military force did not solely rely on the British regiments spread around the Great Lakes. It relied on the Militia forces drawn from the whole non-Native population of adult males residing on the Ontario Peninsula. The second index of force is the ability of the Ojibway to organize themselves into one Native Nation against the non-Native. For example, the Mississauga-Ojibway, as a Native band apart, counted 7,000 souls in 1768; however, under the umbrella of the First Nations, they counted 80,000 (Norman, 1986). A bigger population includes a higher number of warriors. Nevertheless, the second index depends mainly on the presence of an Aboriginal leader who would incite the Native warriors to form an alliance against non-Native forces. Finally, the third index is the degree of the First Nations' dependency on European trade goods. For generations, the Ojibway and their First Nations allies fought their wars aided by European musket, ball and powder (Schmalz, 1990). The French supplied the Ojibway and their allies with weapons, clothing and food, during the war against the Britain, in alliance with France. In the war against the Americans, the Ojibway people bought their weapons through land cessions from the British; however, a war against Britain with no other foreign supplier of European weapons would prove to be

difficult. Moreover, the European trade goods grew to be a necessity, not only for fighting but, for fishing and hunting; aware of the advantages of the European iron and muskets over the bone and antler, the First Nations spent less time, and eventually, forgot their traditional skills of making stone, bone and wood substitutes for iron or brass weapons. With the lack of the adequate tools and skills, the fear of starvation shifted the terms of trade in favor of the Europeans. Subsequently, the Ojibway lost their bargaining power.

According to the theory of force, this chapter will argue that the change in the relative power in each period entailed consistently a new distribution of ownership to land and a new mode of land surrenders; parallel to the change in relative power, land surrenders changed from voluntary exchange to coercion. As the non-Native population and the demand for land grew, the British policy moved from legally recognizing the right of the Native people to dispossession.

4.2 BACKGROUND

4.2.1 THE ORIGINAL INHABITANTS OF THE ONTARIO PENINSULA

From the Late Prehistoric to the Earliest Contact Era, (?- 1641), the Huron and the Petun occupied the southeast of Georgian Bay in the Ontario Peninsula. The Neutral people occupied the Northern shore of Lake Erie. With the advent of the fur trade, the Huron and their western Indian allies traded principally with the French at Montreal, Trois Rivieres or Quebec. With time, the Huron established themselves as middlemen

dealing directly with the French for furs brought to them by Native people residing in the west and the north, and providing European trade goods to the Aboriginal suppliers.

The Iroquois, living in northern New York, exchanged pelts for trade goods at Fort Orange (present Albany). They traded initially with the Dutch, then traded with the English after the English conquest of New Netherlands in 1664; the Dutch colony changed its name to New York. By 1640, the beaver stock in the Iroquois hunting grounds was exhausted. The beaver supply in these territories became insufficient to the Iroquois trading needs. They waged war on the Huron and other nations trading with the French to harvest furs in the hunting grounds of these neighboring tribes. When the beaver wars began, the Iroquois and the Huron were of equal strength numerically. Each group numbered 12,000; however, the Iroquois had an initial military superiority with the use of more adequate firearms secured from traders at Fort Orange, New York.

From 1651-1701, the Ontario Peninsula went through three stages of population shift. In the first stage, from 1650's to 1670's, the Iroquois dispersed the Huron and their allies and temporarily depopulated the Peninsula. They used the southern Ontario land as their hunting ground. In the second stage, 1670's-1680's, the Iroquois established at least half-dozen settlements on the north shore of Lake Ontario. These settlements served agricultural production as well as beaver hunting purposes. The third stage, 1680's-1701, witnessed the defeat of the Iroquois by the Ojibway people and their allies. By 1696, the Ojibway occupied the northern lake shore villages sites of the defeated Iroquois that withdrew to their New York homeland.

The battles in the Ojibway-Iroquois trade wars first began in the Georgian Bay area in an attempt by the Iroquois to gain hegemony in the beaver skin trade. However,

the Ojibway, by 1670, after the fall of the Huron, thoroughly established themselves as the middlemen in the fur trade with the French. Southern Ontario appealed to them for many reasons. First, there was the attraction of furs in the territory between Lake Huron and Ontario. Second, there was the desire for cheap competitive trade goods with the English who were entering the market. Finally, the canoe routes to the south were shorter and safer.

The Ojibway occupied the territory between Lake Huron, Erie and Ontario from about 1701. Prior to the period of their expansion into southern Ontario, the Ojibway occupied an area from the east end of Georgian Bay on Lake Huron to Michipicoten Bay on the northeast shore of Lake Superior. After 1680, the Ojibway separated into two groups. One group migrated along the north shore of Lake Superior. By 1740, the northern group lodged as far as the Rainy Lake. The other group, as mentioned, migrated to the south. The group that occupied the Iroquois defeated villages was later referred to as the Mississauga Ojibway.

4.2.2 NATURE OF CONTRACTS BETWEEN NATIVE AND NON-NATIVE PEOPLE

After the conquest of the Ontario Peninsula in 1701 and until the fall of New France in 1759, the Ojibway in the Great Lakes region prospered in trade, good neighborhood presents and plunder. The Native people were the supplier of the coveted furs that both English and French vied for. The rivalry between France and Great Britain over the fur trade forced up the price of pelts (Schmalz 1990). The price of European

trade goods were lowered by both European powers in an effort to secure the Ojibway as allies in trade and in war. The trade was sometimes conducted, particularly by the French, more for retaining the Native people as allies than for profit. Thus, as long as the colonial rivalry and interests pitted the French against the English, the Ojibway were treated with respect and sought as friends in trade and in war.

The Native people of the Great Lakes, in their alliance with the French, were only interested in the supply of cheap and adequate quantity of trade goods. There was no binding loyalty on the Native people's part to fight for the kings of France. The French forts and traders were tolerated for only one reason: cheap trade goods. Whenever they failed to serve this purpose, the French were not protected by the Ojibway against their enemies; they were attacked (Schmalz, 1990).

The Native people neither anticipated nor desired a decisive victory of one of the European combatants over the other. The elimination of one European power would drive the price of furs down since there was no other foreign competition. Effectively, with the defeat of the French in America in 1760 and the surrender of Montreal to the British, the Ojibway were forced to move from an enviable position with two eager European trading nations bidding high prices for their furs to only one: the English. The Native people could no longer count on the French for military supplies and trade goods.

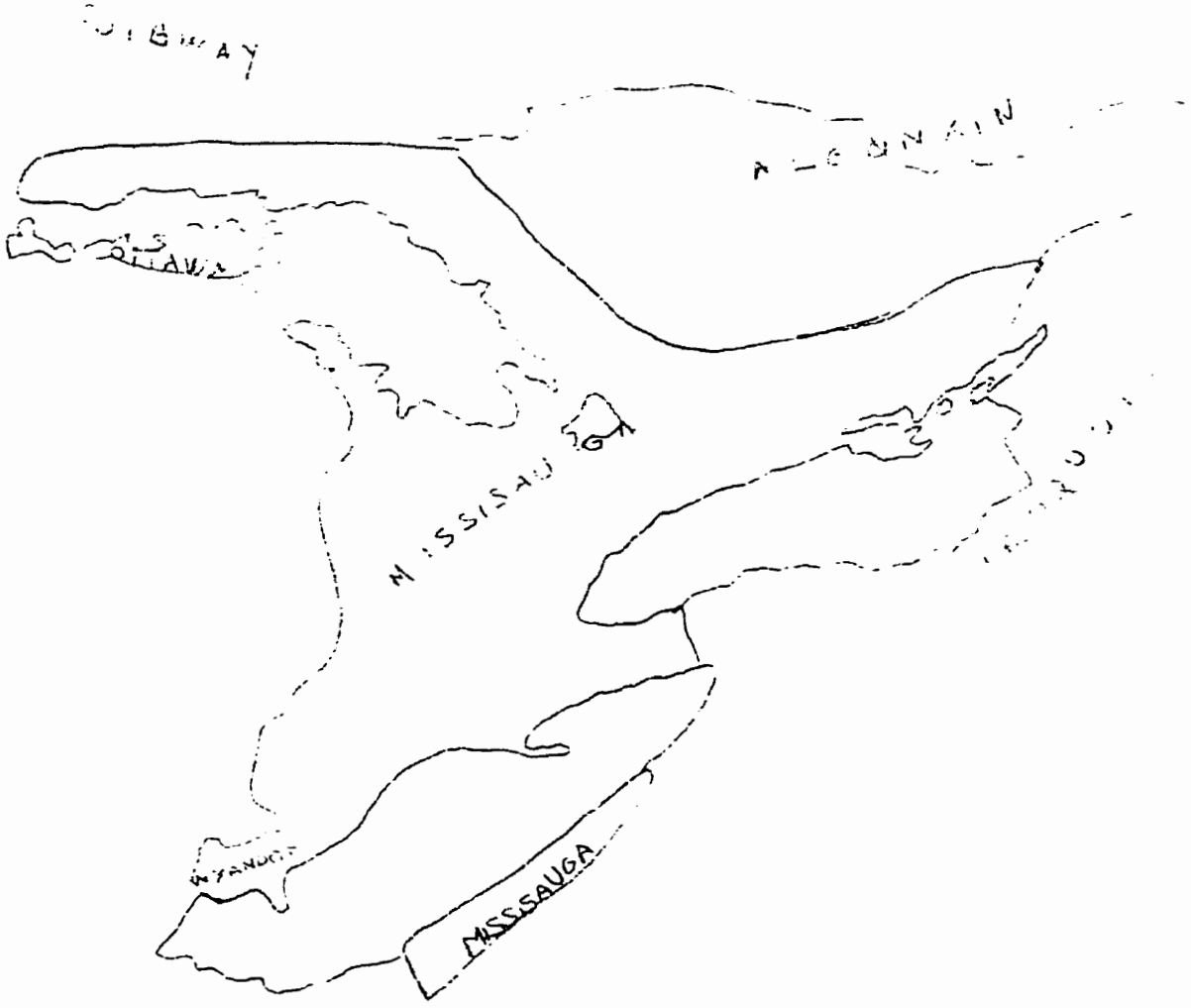
How would the English contract with the Native people now that they are the dominant power on the continent?

4.3 CHRONOLOGY OF LAND SURRENDERS

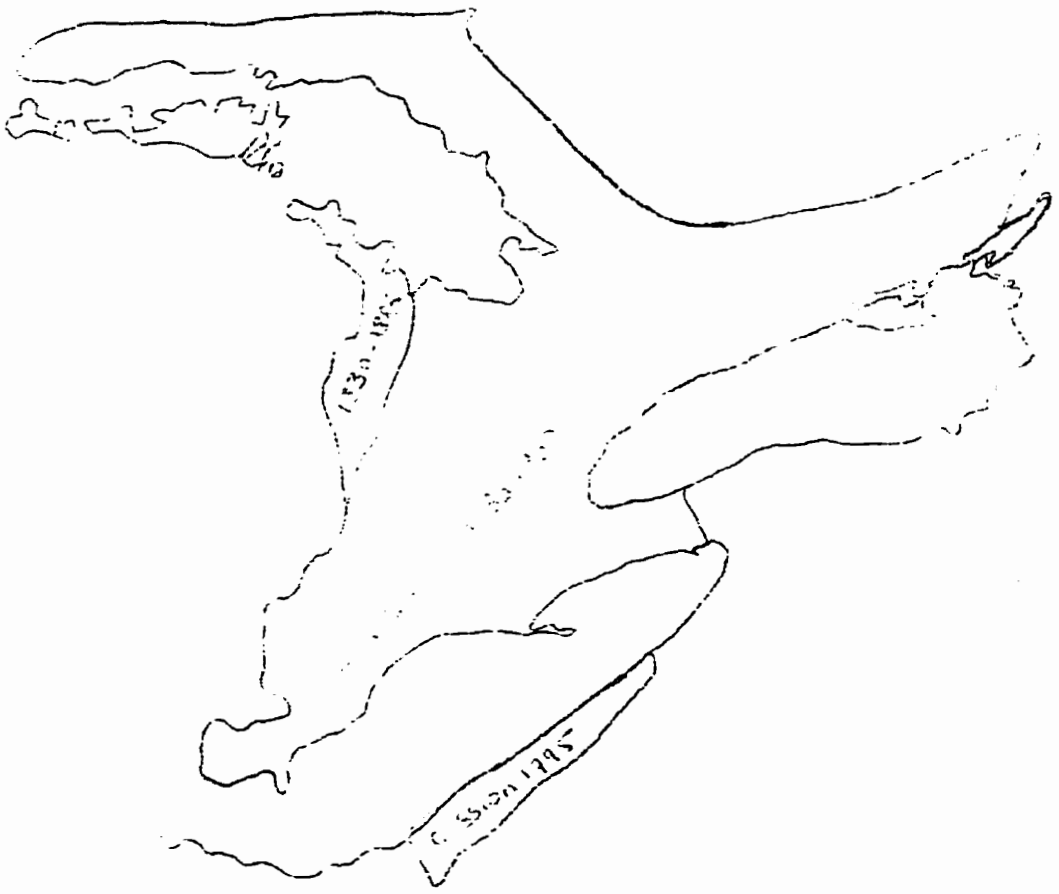
As mentioned in the introduction to the chapter, the dates of the Ojibway land cessions to the British are grouped into three historical periods. These periods correspond to the relative change in power between native and non-native people. This section will argue, consistently with Umbeck's theory, that the relative shift in power entailed a redistribution of wealth or ownership rights. The maps (Map 4.1, 4.2 and 4.3) depict the distribution of ownership rights to the land in Upper Canada, in each period.

4.3.1 The First Period, 1701-1783

During the French era in the Great Lakes, 1720-1761, the Ojibway and the rest of the native people requested from the European military officers and the traders a rent for the posts they occupied and a toll for their passage through the Natives' country (Schmalz, 1990, Norman, 1987). However, the European Seven Years' war, 1756-63, ended with the defeat of the French in America and the placement of all lands east of the Mississippi, which includes the Ontario Peninsula, in British hands. Accordingly, the British troops occupied the French forts on the Great Lakes. However, the British officers exhibited every intention of occupying the whole country rather than being content with the widely separated military and trading posts; they disregarded the frontier diplomacy of food and goods in return for friendship and permission to use tribal lands. The British Governor General, Amherst, saw no reason to abide with this unwritten contract. To Amherst, presents were mere bribery. His policy, in 1761, was that "Service must be



MAP 4.1. OJIBWAY DISTRIBUTION IN THE FIRST PERIOD, 1701-1782



MAP 4.2. OJIBWAY LAND DISTRIBUTION IN THE SECOND PERIOD, 1783-1830

MAP 4.3. OJIBWAY LAND DISTRIBUTION IN THE THIRD PERIOD, 1830-1886

rewarded: it has ever been a maxim with me. But as to purchasing the good behavior either of Indians or any others, is what I do not understand... I know their [Native people's] Incapacity of attempting anything serious, and that if they were rash enough to venture upon ill Designs. I have it in my power not only to frustrate them, but to punish the delinquents with Entire Destruction (Schmalz, 1991, pp. 64) ." However, at the time, no British government official knew the population or the military potential of the Ojibway and their First Nation allies. Britain was soon to discover.

As Umbeck's theory implies, "ownership rights to property can exist only as long as other people agree to respect them or as long as the owner can forcefully exclude those who do not agree (Umbeck, 1980, pp.39)." The British did not agree. Was force essential to the Native People to enforce their ownership rights to the land?

Throughout the Seven Years' war, the Ojibway and the Native people of the Great Lakes had not been in a battle which themselves had lost. Far from feeling defeated, they considered themselves winners. They felt they could simply shift their alliance from the French to the English. Resentment against the British breach of the contract and the British threat on the land started to build up. Plans to remove the British from the Great Lakes followed. According to the indices of force, defined previously, the Ojibway and their First Nations allies were, at the time, powerful. An Ottawa Chief, Pontiac, envisioned and called for an Indian Confederation spanning the forests and valleys from the Great Lakes to the Mississippi. Pontiac traveled about the Great Lakes bands inciting the warriors and tribes to drive out the British and to return to their traditional life-style. He successfully formed a First Nation alliance consisting of 1) the Iroquois in Northern New York, 2,230 warriors, 2) the Ottawa in the straits region of

Northern Lake Huron and Lake Michigan, the Potawatomi in southern Michigan and the Ojibway of Northern and Southern Ontario, a total of 4,130 warriors, and 3) the Miami and their allies along the Wabash River of Indiana plus the Shawnee of Southern Ohio, a total of 4,870 warriors (Canada, 1871). Thus, the military strength and the approximate number of Aboriginal warriors, at the time, was 11,230. On the British side, the military force on the Great Lakes consisted of eleven British forts widely separated and manned. The British garrison numbered only about 120 at Detroit and 338 at Fort Pitt (Norman, 1985); numerically, the Native People outnumbered the non-Natives. As to the Native People's power of bargaining, the First Nations believed in their own power; an Ojibway Chief stated: " Your nation supposes that we, like the white people, cannot live without bread- and pork- and beef! But, you ought to know, that He, the Great Spirit and Master of Life, has provided food for us, in these spacious lakes, and on these woody mountain (Henry, *Travel and Adventures in Canada*, 44)."

Briefly, Pontiac's war or uprising against the British broke out in 1763. In a short time, the Native people took eight forts, killed and captured the equivalent of one-and-a-half British regiment. British civilian losses totaled 2,000 souls.

In the wake of these losses, the British became very conciliatory. Johnson, the British leader of Northern Indian Affairs, called the Native people for peace talks. He assured the Ojibway and their allies that the British "have no designs either on your libertys or possessions. All they require is to live at peace with you, and carry on Trade with the Several Nations. The garrisons are necessary for the security of Goods and stores, and will not Affect you, nor will his Majesty Suffer any of his Subjects to oppress you, whilst you live in friendship with him (Schmalz, 1990)." The British, accordingly,

conceded to restore generous trade relations and to protect the Native people territory from non-Native encroachment. Effectively, the Ojibway and their allies began to receive ample supply of presents: Presents that had been initially cut off. Most important, the Native people exclusive rights to the land had been recognized and decreed in the 1763 Royal Proclamation.

In the first period, force was essential and successful in enforcing the Native people's ownership rights to the land. The Ojibway retained their ownership rights to about 133,975 km^2 of land in Upper Canada and on the southeastern coast of Lake Erie (Map 4.1). The 1763 Royal Proclamation decreed that lands lying west of the Appalachian Mountain be deemed an Indian Territory. The boundaries of that territory included the present province of Ontario south of Lake Nipissing and west of Cornwall. This proclamation "legally" protected all the Ojibway lands.

4.3.2. The Second Period, 1783-1830

The 1763 Royal Proclamation distributed ownership rights in proportion to the distribution of power at that time. Umbeck's theory predicts that an increase in one party's ability to use force will offset the equilibrium point or the agreed upon distribution of ownership rights. As a test to this hypothesis, this section will describe a) how an increase in the American power entailed the dissolution of the 1763 Royal Proclamation on the American territory, b) when and why the British Loyalists settled in Ontario and c) how the distribution of force between the Ojibway and the British dictated the nature of contracts between the two parties.

a) ***The American Expansion***:

Settlers began to flow rapidly and intensively into the Ohio valley shortly after Pontiac's war. The settlers were frustrated by the Royal Proclamation of 1763 that restricted their movement into the Indian country. The American settlers wanted to acquire the land for farming and land speculation. These objectives necessitated the abolishment of the constraints imposed by the British policy. Force was again essential to redistribute ownership rights to the land. The American Revolution of 1775 served this purpose.

The American settlers were new comers to the Native Territory. The land belonged to the Native People. The settlers, like miner Y in chapter three, had no land. Land to cultivate was essential to the survival of the settlers who were mostly farmers. However, land in its wild state was essential to the survival of the Native People who were mainly hunters and gatherers. If the settlers and the Native People value their survival equally, they must place the same value on the land. Nevertheless, the conclusion that both native and non-Native valued the land equally can be derived from their readiness to engage in war, to defend or claim the land. Both parties were ***willing*** to pay the same price. However, in economics, the demand for land, or any other good, is based on the ***ability*** to pay, as well as willingness to pay. Since the essence of property rights is the ability to exclude other, the ability to pay is equivalent to the ability to exclude others.

Did land effectively flow towards those who are the most forceful and able to exclude others?

On the American the side of the 1763 Proclamation line boundary, the non-Native population in present Kentucky grew from 300 in 1775 to 73,000 in 1790. Northern New York and western Pennsylvania had, respectively, a population of 92,000 and 36,000 in 1790. At that time, on the Native People side of the 1763 boundary line, Pontiac's prestige and leadership among the First Nations had rapidly disappeared after he conceded to peace with the British. The Aboriginal population in Western New York and Pennsylvania and southern and eastern Ontario was not much over 30,000 (Norman, 1986). After an American-Indian war that lasted from 1777 to 1795, the obvious numerical strength of the growing American population imposed peace and a new treaty, 1795 Treaty of Greenville. This treaty "opened up land for settlement northwest of Ohio River and along the southern coast of Lake Erie as far west as present Cleveland at the north of the Cuyahoga River." With this treaty, the Ojibway lost their territory of about 4725 km^2 on the southern coast of Lake Erie (Map 4.1).

As predicted by Umbeck's theory, the increase in the American power entailed a redistribution of ownership rights to land in accordance to the new distribution of power. The increase in the numerical strength of the American people, indeed, offset the distribution of ownership rights to the land stipulated in the 1763 Royal Proclamation. That distribution was forcefully decreed at the time at the outset of Pontiac's war. The new distribution of power, in its turn, precipitated a new distribution of rights to the land. On the American-Native people front, the terms of the 1763 treaty ceased by force to have any bearing on the relations between the Native People and the Americans. The Native people lost their legal rights to the land. American settlers would frequently

occupy Native People land before any treaty is signed turning the land over to the federal government (Norman. 1986).

b) ***The British Settlement on the Ontario Peninsula***:

On the British-First Nations front, the Ojibway homeland on the Canadian side of Lake Ontario and Lake Erie remained in a state of equilibrium until the middle years of the American Revolution. Till 1783, the land was exclusively Indian country, except for some fur traders and the occasional isolated settler. The year 1783 marked the defeat of the British in the American Independence war and the establishment of the Canadian-American border that extended from the Atlantic Ocean through the Great Lakes to Lake of the Woods. The United Empire Loyalists who had moved to the Province of Quebec during the American Revolution and attacked the frontiers of New York and Pennsylvania could not return to their former homeland. Thus, the British governor decided to accommodate them along the northern and western shores of Lake Ontario; it secured a series of treaties with the Mississauga Ojibway to provide lands for the settlement of the Loyalists. During 1783-5, about 10,000 refugees and soldiers from the United States settled on the Niagara Peninsula and on the northern shore of Lake Ontario occupying an area of 3,200,000 acre (Caniff, 1864). Between 1783 and 1806, Britain acquired the waterfront along St. Lawrence River, Lake Ontario, the Niagara River, Lake Erie, the Detroit River, Lake St. Clair and the St. Clair River. The British officers secured land surrenders along the north shores of the Upper St. Lawrence River and Lake Ontario, for Loyalists entering Canada via Johnstown (Cornwall) and Niagara. For Loyalists

entering Canada by the way of the Detroit frontier, lands between Lake Erie and the Thames River and inland from Lake St. Clair were secured.

In Canada, the 1763 Royal Proclamation continued to be enforced: the First Nations rights to the land must be surrendered in negotiations between the Crown and the First Nations before any settlement could take place. The difference between Canada and the United States is that, in Canada, the Ojibway and their First Nations allies still outnumbered the recent 10.000 refugee to the land (Schmalz, 1990). The fear of the Ojibway as enemies and the need for them as allies against the American expansion were the dominant motivating force behind the abiding by the 1763 Royal Proclamation and the tradition of distributing presents to the Natives.

c) ***The Nature of Contracts between native and non-native people:***

In a treaty referred to as "Gun shot Treaty" (Johnson, 1973), the Mississauga Ojibway were persuaded to sign a blank deed in 1783 for the whole area from Etobicoke Creek west of Toronto to Trent River. However, the British government did not confirm for consider the treaty to be valid, since it was improperly drawn and signed (Johnson, 1973). Thus, the area was not surveyed and was not filed in a legal description. At a second meeting with the Mississauga in 1787, the government purchased, for 1,700 pounds in cash and trade goods, an area stretching from the Don River to Etobicoke Creek and reaching inland twenty four miles. This purchase, referred to as the "Toronto Purchase Treaty", settled satisfactorily the surrender of part of the area covered by the Gun Shot Treaty. The remainder of the land was not surrendered. In 1876, the

government surveyed the Home district east of Toronto. These areas, however, were not surrendered in treaties.

The Ojibway considered the early surrenders as fair. Settlers that are to inhabit the land will teach the Native people the art of farming. The British government will provide them with the service of a blacksmith and a doctor. Most important the Native people would be permitted to fish and hunt as before. In the land surrender in the Lake St. Clair region, the Ojibway were told that the land would be for the use of the displaced Ojibway allies in the war against the Americans; the Ojibway readily agreed to the surrender in return for 772 knives, 278 pounds of gunpowder, 2100 pounds of shot and ball, and 26 rifles, 3456 tobacco pipes, 333 kettles and 1498 blankets. Being at war with the United States, the Ojibway highly valued these trade goods. Moreover, the treaties signed had a verbal agreement to protect the Native people from white encroachment on their hunting and fishing grounds.

However, settlers begun to shoot deer, bear and game birds by the thousands and to encroach on the Native fisheries. A Mississauga Chief complained: "Colonel Butler told us the farmers would help us, but instead of doing so when we encamp on the land they drove us off and shoot our dogs and never give us any assistance as was promised to our old Chiefs." Moreover, the land that was surrendered to the use of the displaced native people was used for non-native settlement. Why didn't the Ojibway forcefully enforce their ownership rights as they did in Pontiac's War?

The Ojibway on the Ontario Peninsula felt the impact of settlers on the land in different degrees. The Ojibway in the immediate vicinity of the Loyalists felt the scarcity of forest and Lake products and feared starvation; their hunting and fishing grounds

became inundated by settlers that competed for and consumed their natural resources. However, the Ojibway farther north and away from the settlers actually benefited from the non-Native expansion. Previously, these Ojibway sold only furs for few traders. The coming of Loyalists increased and diversified the demand for their products. They began to trade a variety of surplus game, fish, large quantities of maple sugar, berries, Indian corn, baskets and canoes. This economic disparity among the Ojibway failed to unite them against the non-Native expansion and the encroachment on Native Land. Moreover, the non-Native population grew in Upper Canada from approximately 10,000 during the period 1783-5 to 20,000 in 1791 (Caniff, 1869). "The "General Return of Militia for the Province of Upper Canada" in 1794 indicated that over 5,000 soldiers could be mustered. In the same year, all the Indians in the Southern Great Lakes would have had difficulty in matching such a force (Schmalz, 1991, p.105)." A devastating epidemic of small pox in 1793 and a continuing warfare against the American south of the border considerably decreased the Ojibway military power. A successful military campaign against the English was out of the question. But if the Britain outnumbered the Native people why were they still giving a token effort to enforce the 1763 Royal Proclamation in land surrenders? Why were they still compensating, in some cases, the Native People for the dispossession of their land by distributing presents?

A war between Great Britain and the United States was imminent. The 1845 Report on the Affairs of the Indians in Canada described the incentives of distributing presents as an essential policy to, first of all, "conciliate the Indians, to ensure their services, and to supply their wants as warriors in the field: and afterwards, in time of

peace, to secure their allegiance towards the British Crown, and their good will and peaceful behavior towards the white settlers (Canada, 1845)."

Thus, the early land treaty can be considered as a market transaction where the land was traded for European goods.

4.3.3 The Third Period, 1830-1889

As the possibility of hostilities in America declined and the white settlers greatly outnumbered the Indians, the need for the Native people as allies and the fear of them decreased (Schmalz, 1990). In the same token, the British government policy towards the natives substantially changed. No longer considered or needed as military allies, in 1830 the British government transferred the Native people from the charge of the Military authorities to that of the Civil Governors in both Provinces (Quebec and Ontario). Moreover, the maximum expense of the Indian Department was fixed at £20,000, as opposed to an annual budget of £60,000 in 1811, £125,000 in 1815 and £350,000 during the war. One fifth of the expenses constituted land purchases. The rest of the expenses were in the form of presents distributed to the Ojibway and their allies.

The most significant change in the British policy was the change in the application of the Royal Proclamation (1763); land surrenders changed from voluntary exchange to coercion. This change coincides with the threshold of rapid non-native population advance along a band west of Lake Erie in 1830. This threshold was brought about by the completion of the Erie Canal linking the Mohawk River with Buffalo, New York. An influx of easterners into Upper Canada, as well as immigrants settlers from Europe,

followed the spurt in the Great Lakes traffic. The former was enhanced by the introductions of stream navigation in 1818. The Non-native population in Upper Canada grew to 220,000 by 1830. The Native population at that time was about 6,300. This change in power is considered to contribute to the subsequent redistribution of wealth or ownership rights to the land.

In 1836, the Lieutenant Governor, Francis Bond Head, obtained, coercively, the surrender of Manitoulin Island so that it could be made "the property (under Your Great Father's control) of all Indians whom he shall allow to reside on them (Canada, p.12-13)."The British Government terms of exchange were 23,000 acres of barren islands can be recognized as Indian property in return for the surrender of 3 million acres of arable land in the Bruce Peninsula and Watershed. The general superintendent of Wesleyan Missions who eye witnessed the surrender reported the proceedings:

> Sir Francis wished the Indians to surrender the whole of that territory to him; they declined; he endeavored to persuade them, and even threatened them, by telling them that he could not keep the white people from taking possession of their land, that they (the Indians) had no right to it only as hunting-grounds etc. They told him they could not live on the Munedoolin Island, that they would not go there, that they wanted land that they could call their own... The council of the Saugeen Indians separated. About an hour or two after, Sir Francis called them together again, renewed his proposals, persuasions and threats. The Indians refused. Sir Francis then proposed that if they would surrender to him the territory adjoining the Canada Company's Huron tract, he would secure to them and their children the territory north of Owen Sound...and build them houses on it from thee proceeds of the sales of the territory... To this purpose...the poor Indians did readily accede with tears in their eyes. (Aborigines' Protection Society, 1843, pp.16-20)."

In 1837, the Natives gained powerful allies in England: The Aborigines' Protection Society. The former along with the Wesleyan Methodists and the Native People strongly protested against the surrender of about 1.5 million acres in the Bruce peninsula watershed. For the surrender 1) made no specific references to traditional

compensation. 2) was not signed by all those who had a right to sign and 3) those who were present resisted the surrender. Notwithstanding, the British Government refused to reverse its decisions on the coerced surrenders. It merely compensated the Native people with an annuity of 1,200 pounds, three and a half pence per acre. In addition, a Royal Deed of Declaration of 1846 was issued to prevent another 1836 expropriation. The Declaration stated that the Native people and their descendant were to "possess and enjoy" the remaining 450,000 acres on the Bruce peninsula.

Will the British Government abide by the 1836 Royal Deed of Declaration? Would an increase in Non-native power consistently erode Native people's right to land?

The famine in Ireland, the skyrocketing population growth in England, and the displacements caused by agricultural revolution combined to create an exodus of British immigrants to Canada West (Ontario) (Schalmz, p.141). The percentage of Ontario population by English, Irish and Scottish origin grew from zero percent in 1854 to 271.1 %, 345.1% and 202.9% , respectively, in 1871 (Canada, 1871). In 1871, the non-native population grew over one million. The population of the Native people residing in Upper Canada counted 12, 978 souls. Land squatters grew out of control. Oliphant, Superintendent of Indian affairs reported an threatening situation to Governor General Elgin in 1854:

> They [the pioneers] threatened, in my presence, to settle upon the Indians' reserve [Saugeen] in defiance of the Government. The general principle that Indian concessions are beneficial alike to the Indians and the white, was here merged in a more important consideration. So keen was the struggle for land, that a surrender of the territory for the purpose of sale, appeared the only method by which the property of these tribes could be conserved to them. It therefore became an obligation upon the Indian Department to spare no pains in endeavouring ***to wring from those whom it protects,*** some assent, however reluctant, to the adoption of the only means by which this object could be achieved. That there should be some disinclination existing on the part of a

partially civilized community to cede for ever those lands which formed the hunting grounds of their fore-fathers...is to be expected (Archives of Ontario. 1856)."

To "wring an assent' from the Native people was essential to prevent bloodshed and the possible loss of Aboriginal land without compensation to the Native people. However. this assent the Native people were disinclined to give. The Department of Indian Affairs threatened them:

After talking all day yesterday and nearly all last night. on the subject of your reserve. you have concluded not to cede your land to the Government... You complain that the whites not only cut and take your timber from your lands. but that they are commencing to settle upon it. and you cannot prevent them. and I certainly do not think the Government will take the trouble to help you... The Government. as your guardian. have the power to act as it pleases with your reserve (Johnson. 1973).

In 1854. The Bruce Peninsula. expect for five large reserves. was ceded to the Crown. The surrender stipulated that the ceded land is to be sold by the government. at a public auction. to the settlers. The sale of the land is to the sole benefit of the Native people. owners of the land. With the tremendous demand for land. the Saugeen people expected a substantial income from the land sale. The prices of land. in 1856. ranged from $30 per acre to $2.200.

Why should the settlers agree to pay for what they were willing to obtain by their own personal force? Effectively. they will not.

The sale of the land was arranged by installments. The first installment is one-fifth of the money paid at the time of purchase. The four-fifth of the money is to be paid in four installments at equal consecutive years at an interest rate of 6 per cent. If the installments were not met. the land sale is to be canceled with the loss of the down-payment. The land was to be resold for the benefit of the Native-people. Moreover. the

settlers had to pay timber dues. The license to cut timber is of $4. The charges for the classes of timber cut off ranged from $30 for 1000 cubic feet of squared oak timber to 20 cents for a cord of soft cordwood. However, several years later, many settlers complained to the government that they bid on the land beyond their means and that "such money were needed more by them than by the Ojibwa (Schmalz, p171)." In the parliamentary session of 1869, the MPP for North Bruce stated that "One-third of the purchase money, required at the time of sale, would in most cases represent the value of the lot, and I hope some plan would be adopted to relieve the settlers of two-thirds of the price (Cape Croker Archives)." Indeed, three re-evaluation tasks of land value resulted in the elimination of tens of thousands of dollars in interest payment and the reduction in the price of land not yet sold as well as the sold one.

In the same manner, in 1857, the Ojibway lost 10,0000 acres of land in Nawash and 6,000 acres in Colpoy Bay, in 1861. In 1885 and 1886 the majority of the islands off the coast the Bruce Peninsula were relinquished.

4.4.THE TAKING OF THE OJIBWAY FISHERIES

Fisheries around the Bruce Peninsula provides a case study of the model developed in chapter three. The assumption of independent and homogeneous fisheries is applicable to the fisheries in the Bruce Peninsula.

The Ojibway people experienced as many difficulties in retaining possession of their traditional fishing grounds as in retaining possession of their land. The potential always existed for a large commercial fishery within the traditional waters of the

Ojibway, particularly around the islands in Lake Huron and Georgian Bay. However, the actual development of such a fishery awaited the development and growth of a large local market and/or the means to transport fish to large external markets.

The growth of the population of Ontario from 50,000 in 1791 to 952,004 in 1851 created the needed local market and the demand for fish. The additional demand from an external market, Detroit, rendered fish a valuable resource.

Legislation to protect the fisheries was in enacted in 1807 in Lake Ontario, in 1823 in Burlington Bay, in 1833 in the Niagara, Detroit and St. Clair rivers, and in 1843 in Lake Erie (McCullough, 1989). However, no such legislation existed to protect the fishery in Lake Huron till 1858. The reason was that the Ojibway had not yet surrendered their islands to the British Crown. The ownership of the Islands or the land fronting on the fishery entailed the exclusive rights to fishing ground; during this period, the land was essential to operate a fishery: to set seine nets and to cure the fish. Therefore, without the right to occupy the Islands the British Crown had no power to regulate the fishery or issue licenses of occupation to the land (McCullough, 1989). The right to fish and the right to occupy the fishing ground were complementary.

Treaty No. 45 and Treaty No. 45 1/2 established the ownership of the Ojibway to the fishing grounds around Lake Huron and Georgian Bay. Treaty No. 45, the 1836 Surrender of Manitoulin Islands stipulated:

> I [Francis Bond Head] consider that from their facilities and from their [Manitoulin Island, Lake Huron] being surrounded by innumerable fishing islands, they might be made a most desirable place of residence, as well as to be totally separated from the Whites; and I now tell you that your Great Father will withdraw his claim to these islands and allow them to be applied for that purpose

Treaty No. 45 1/2, the 1836 Surrender of Southern Saugeen and Nawash territories , stipulated:

I [F.B. Head] propose to you that you should surrender to your Great Father the Sauking Territory you at present occupy, and that you should repair either to this island [Manitoulin] or to that part of your territory which lies on the north of Owen Sound.... your Great Father engages for ever to protect for you from encroachments of the Whites.

The above treaties entitled the Ojibway , solely, to ownership of the fishing grounds.

However, the fishery around Lake Huron and Georgian Bay grew to be a source of noticeable profits and wealth. The Huron signal, a local newspaper, reported in 1848:

The Lake [Huron] is a source of more than pleasure and admiration; it is a source of considerable profit. The immense quantities of Herring, Trout, and Whitefish caught and exported annually occasion perhaps a greater amount of trade than any other article of exportation.

The distribution of wealth stipulated in the treaties did not coincide with the distribution of power in 1836. At that time, the non-Native population in Upper Canada was about 375,000. The First Nation people were widely separated, living in reserves. Their total population was 28,000. The most powerful will not agree to less wealth than that he can get through the use of force. Effectively, the valuable fisheries had attracted non-Native encroachment on the traditional fishing grounds of the Ojibway, not yet surrendered. A year after signing the 1836 treaties, the Chief superintendent of Indian Affairs wrote:

the fishing is bountifully supplied and has attracted the notice of white people who annoy the Indians by encroaching on what they consider their exclusive right and on which they rely much for provisions.

In 1838, the Chief Superintendent reiterated:

> This fishery has attracted the notice of the white traders who resort hither at certain seasons to the great annoyance of the resident Indians who claims the exclusive privilege of fishing at the spot (Ontario Report, 1993, pp.438).

The case of the Fishing Islands provide a good illustration of the abrogation of Native People's rights to the fishery by subsequent quarrels and legislation.

Alexander McGregor of Goderich operated a fishery at the Fishing Islands. He had an annual contract to deliver 3,000 barrels of fish to Detroit. In 1835, a petition by the Ojibway Chief stated that: "McGregor is encroaching on the Indian's fisheries contrary to their wish, and hopes his Great Father the Governor will order to have him driven off from their territory (Petition, 1835)." The Ojibway were not powerful enough, at the time, to drive off McGregor from the Fishing Islands. However, the rich fishing grounds had attracted a third-party of non-Natives more powerful and influential than McGregor. The political connections of the Huron Fishing Company secured it a license of occupation for the Fishing Islands in 1834. However, the license was conditional on the company reaching a fishing agreement with the Ojibway. The Ojibway agreed to lease the Fishing Islands for a yearly sum of 25 pounds. They knew that the only way to prevent non-Native encroachment on their fishing grounds was to secure the support of a powerful non-Native party able to protect the fisheries on their behalf. Predictably, the Huron Fishing Company acted as the owner rather than the tenant of the Fishing Islands. James Evans wrote in 1838:

The Huron Fishing Company have here a fine fishery, not unfrequently taking between three and four barrels of herrings at one haul of the seine. They are erecting some substantial buildings and will doubtless succeed in securing the possession of (and) this ground etc. erecting extensive fishing works (and the) unless the Indians give them to understand that they intend to occupy this station themselves.

In 1839 the Ojibway filed a petition. They required an assistance from the Government to keep the non-Native fishermen who leased the Fishing Islands in "due bounds." They complained that the non-Natives "pretend to a claim forever and say they never will go away (Petition, circa 1839)."

The Huron Fishing Company went out of business in 1840. By then, MacAuley reported that the fishing grounds at the Bruce Peninsula had become "frequently the scene of violence with interlopers and trespassers (MacAuley, 1839)."

In 1843, Chief Wahbahdick wrote to the Colonial Secretary requesting that the Native People be given "a piece of paper" to show to any non-Native attempting to settle on their land (Letter, 1843). Answering the concerns of the Ojibway, in 1847, Queen Victoria issued the Imperial Proclamation of 1847. The former confirmed the Ojibway title to the entire Bruce Peninsula, including any Islands in Lake Huron within seven miles of the mainland. Mr. Lytwyn, an historical geographer, testified in *Regina vs. Jones* "that the seven mile limit and all the islands within that limit essentially captured the entire fishery at the time since in 1847 there was no deep-water fishing in Lake Huron or Georgian Bay (Ontario Reports, 1993).

Consistently with Umbeck's model, the Royal Proclamation of 1847 was not enforced. In 1851, the proportion of native people to non-native was 3.4 per thousand (Canada, 1871). The cost of fishing operations increased with technological changes. The early method seine fishing required at most a capital of $100. The new fishing method, a

gill-net operation with a sail boat, required a capital of at least $500 (McCullough, 1989, pp.53). The government, holding position of guardian with full control over the Ojibway, refused repeatedly in 1856 and 1857 to advance funds for the Ojibway to purchase fish barrels, salt, sail boat and nets: the Ojibway were not able to develop their commercial fisheries and compete with the non-native people. Apparently, the Ojibway population and their trading terms were not as powerful as the non-native people. In 1858, with the wake of a new Fisheries Act, the Ojibway were advised that they were expected to pay rent for the use of their fishing grounds. Though, the Fishing Islands were not surrendered, yet.

4.5. CONCLUSION

This chapter documented the relationship among force, the distribution of wealth and the incentives to abide by agreements. The relationship suggests that any program or policy that re-distributes wealth among individuals must take into account the distribution of power among the affected parties. A policy that distributes to individuals less wealth than that they could have through the use of their own force will be a costly failure. This is illustrated in the history of the settlement of the Ontario Peninsula and the subsequent distribution of ownership rights to, mainly, land and fisheries.

In the first period (1701-1783) a British policy aiming at claiming the land from the Native people proved to be a failure. The Ojibway, at the time, were more powerful than the British and able to enforce their ownership rights to the land; there were no form of land surrender in this period. In the second period (1783-1830), the power of the

Ojibway began to diminish. Equivalently, their ability to retain their ownership to the land diminished. The Ojibway started to surrender land to the British in this period. However, the land surrenders in this period were in the form of negotiated transactions of land for European goods. The British made a token effort to compensate the Ojibway for the loss of their land: at the time, these Native people were needed as allies to repel any American aggression on Upper Canada. Finally, in the third period (1830-1889), the Ojibway surrendered the remainder of the Ontario Peninsula. The land surrenders in this period changed from voluntary exchange to coercion. As the number of settlers greatly outnumbered the Ojibway and the threat of American hostilities declined, the British had no longer an incentive to compensate the Ojibway for the loss of their land.

The Bruce Peninsula fisheries provide a further test to Umbeck's theory of force. The Ojibway rights to the fisheries were abrogated, as in the case of the land. However, while the land was surrendered, voluntarily or coercively, the Ojibway did not surrender their right to the fisheries in the Bruce Peninsula. After a century, the Native rights to their fisheries were re-instated in the 1982 Constitution. But, Umbeck's theory is consistent in explaining why the non-Native are reluctant to abide by the Constitution Act.

CHAPTER FIVE

THE END OF COLONIAL PERIOD

5.1 INTRODUCTION

As outlined in the previous chapter, in the first period (1701-1782), the Native people retained a high degree of autonomy. In the subsequent periods (1783-1830, 1830-1889), they gradually lost this autonomy. The Ojibway, after relinquishing millions of acres in the Ontario Peninsula, retained a small portion of their ancestral holdings and were permitted to settle on small tracts isolated from European settlements. These tracts were for the exclusive use of the Native people. Non-Natives were discouraged from living among Native people in these reserved areas; thus, evolved the "Indian reserve system."

Passing onto reserves, the Ojibway lost the control of the decision-making process over their political, economic and social affairs. The British North Act, 1867, and the Indian Act, 1876, gave the federal government the responsibility for the management of the Native people. Under these Acts, the Native people were considered legally as wards of the Crown. That is, for legal purposes, their position was similar to minors. The government held position of guardian with full control over their lands, property, money and rights.

This period of reserves regulation which overlaps with the treaty writing periods previously described, began to end at the end of World War II. After 1950, the living conditions of the Native people began to improve, their culture began to revive and their political action to gain impact (Schmalz, 1990). Most importantly, the Constitution Act, 1982, gave a measure of control over the government conduct and a strong check on its legislative power. It required the government to bear the burden of justifying any legislation that has some negative impact effect on any aboriginal right protected under s.35(1) (Ontario Reports, 1993).

In 1993, one acre set for a burying ground in the treaty of 1857 was returned to the Ojibway band. Four years ago, two non-Native houses were built on this piece of land. Moreover, the Provincial Court ruling, *Regina vs. Jones 1993*, gave the Native people priority in fishing rights. This priority is equivalent to entitling the Native people with a bigger share in the fishing quotas.

Does the relative restoration of rights and lands to the Native people correspond to an increase in the Native people's power, as Umbeck theory would imply? This chapter will test whether Umbeck's theory is consistent in explaining the current restoration of property rights to the Native people. This chapter will begin by describing the situation of the Native people during the Colonial period before the Second World War. The Second World War was a turning point in the nature of the relationship between native and non-native people.

5.2. THE COLONIAL PERIOD

The reserve period is referred to as the colonial period. In 1876, the Indian Act set up the framework for Canada's administration of its aborigines. A deputy minister of the Indian Affairs Branch described the Acts as follows:

"The Indian Act is a Land Act. It is a Municipal Act, an Education Act and a Societies Act. It is primarily social legislation, but it has a very broad scope: there are provisions about liquor, agriculture, mining as well as Indian lands, band membership and so forth. It has elements that are embodied in perhaps two dozen different acts of any of the provinces and overrides some federal legislation in some respects...It has the force of the Criminal Code and the impact of a constitution on those people and communities that come with its purview (Schmalz, 1990, p.196)."

In terms of the three indices of force described in chapter four, the Natives were relatively weak. First, they were far outnumbered by the non-Natives, with a ratio of 14:1000 (Canada, 1881). Second, they lacked unanimity; some bands did not understand the impact of the Indian Act. The Algoma Ojibway decided to send a petition "to the Imperial Government praying to have presents renewed which were stopped some twenty-five years ago (Schmalz, 1990, p.205)."They obviously lacked understanding of their present political realities since Britain had cut its ties with the Native people of Canada in 1860. Finally, as to their trading and bargaining power, the Act made them minors that lacked control over their money or rights.

As such, the Native people lacked the power necessary to maintain some control over political and economic decision making. The Government, through the Department of Indians Affairs, became the "dictator" of almost every aspect of the Natives' lives. This situation lasted till the end of World War II.

5.3. THE EFFECTS OF WORLD WAR II

The participation of the Native people in World War II resulted in, first, the developing of a brother-in-arms relationship with non-Native Canadians. The media extensively publicized Native participation in the war effort and promoted a new public interest in their plight at home (Schmalz, 1990). Second, the war brought the Native people across Canada into contact with each other which lead to a Pan-Indian consciousness and to the participation of the Ojibway in a nation-wide Pan-Indian movement. Third, with the end of World War Two many colonies around the world sought their independence from colonial rule. As a result Natives began to view themselves as colonial people and similarly sought self-government and independence. In addition, the civil rights movement in the United States contributed to Native aspirations of equity and freedom (schmalz, 1990). However, most importantly the idea of equity and freedom for Natives was supported by non-Natives. Accordingly the government began to give Natives more control over their own social and economic affairs. This was brought into force with the 1982 Constitution Act which recognized and affirmed Native treaty rights.

It is important to note that even with new consciousness of non-Native people toward Natives plight there was no major redistribution of wealth. For an actual redistribution of wealth there should be a redistribution of power. The Native people were still outnumbered by the non-Native. The Ontario government does not enforce the 1993 provincial court ruling that gave the Ojibway priority in fishing rights. Sports and

commercial fishermen are more politically powerful than the Ojibway. they will not agree to less fishing rights than they have at present.

5.4 CONCLUSION

It was not until after the Second World War that non-Natives began to recognize Native rights. However, recognition of Native rights did not translate into transfer of resources. For the Ojibway of the Bruce Peninsula little changed with regards to their fishing rights.

Nevertheless, the recognition of the Native people's rights and the ownership of the native people of valued reserve land contradict Umbeck's theory. Some reserve land has increased in value as the tourism and the cottage industry have grown. Why didn't the non-Native encroach on the high valued land? The Native people are still outnumbered by the non-Natives.

The Constitutional recognition of the Native people treaty and aboriginal rights was not brought by the increase in the Native's ability to use force. How does the new consciousness to the Native people's rights modify Umbeck's theory.

In conclusion, improved modeling of an institutional change requires the understanding of just what how new consciousness or morality catch hold. It requires the definition of the interplay between changes in wealth, power and the ideas and ideologies that form people's perception of the nature of property rights.

CHAPTER SIX

SUMMARY, POLICY IMPLICATIONS AND RECOMMENDATION FOR FURTHER RESEARCH

6.1 SUMMARY

The purpose of this thesis is to test Umbeck's theory of force: the Theory of the Formation and Initial Distribution of Property Rights. The theory should explain the observed pattern in the distribution and formation of property rights to the land and the fishery at the Bruce Peninsula.

The principle objectives of this study and the major results of the study related to the objectives were:

1. To review the property theories that explain the process and pattern of property rights change. The point is to determine the relevant factors that impact the formation and allocation of property rights. The theories are 1) Demsetz's theory of property rights, 2) interest group theory and 3) Umbeck's theory of force. Demsetz's theory of property rights emphasises the role of new economic opportunities or economic growth in institutional change. The interest group theory emphasises the role of the political or equity factors in institutional change. Finally, Umbeck's theory explains why the political power and the equity factors are important in modelling institutional change.

2. to develop a theoretical framework

Based on Umbeck's theory, a model that describes the process of distribution of property rights to fisheries among competing fishermen is developed. Fishermen's revenue curve from the fisheries are presented. The revenue derived from one fishery are contrasted with the cost of defending/acquiring a fishery. It is shown that the equilibrium point in the allocation of rights to the fisheries is reached when the cost of defending/acquiring a fishery equals the revenue from that fishery. For fishermen with different ability to use force the most forceful will have lower costs of acquiring or defending a fishery. This advantage will make the more forceful fisherman cost competitive, resulting in the takeover of a large share in the operating fisheries.

The implications of the model were 1) wealth is distributed equally only when the competing parties are equal in their ability to use force, 2) the most forceful party or individual will receive more wealth than those who are relatively weak.

3. To empirically test and apply the model developed in chapter three.

The case study of the settlement of the Ontario Peninsula is an empirical test to the model's second implication: The most forceful party or individual will receive more wealth than those who are relatively weak. The variance of force between the competing parties, over land and fisheries, provided a test to the correlation between force and distribution of ownership rights. Three consecutive periods where the distribution of force between the Natives and the non-Natives are described. The point is to show that different periods with different distributions of force entailed a new mode of contracting and distributing property rights. The first period (1702-1782) where the Natives were more powerful than the British is characterized by Ojibway domination over the land. The second period (1783-1830), where the Natives' power began to diminish, witnesses the

loss of their land in the United States and the settlement of the British Loyalists in the Ontario Peninsula. However, the settlement was in the form of negotiated treaties. At the time, Britain needed to maintain the Ojibway as allies against the American expansion: Compensating the Ojibway for the loss of their lands was essential. In the third period (1830-1886), the non-Natives greatly outnumbered the Natives and the American threat receded. Parallel to this, the Ojibway began to lose their land with no compensation through coerced treaties. The significance of the loss of the Ojibway fishing rights in the Bruce Peninsula reinforces Umbeck's theory of force. The Ojibway fishing rights in the Bruce Peninsula were never surrendered, however, government regulation of the fisheries abrogated those rights. After a century, the 1982 Constitution and the subsequent provincial court ruling still failed to assure or restore native fishing rights and priorities. This is further evidence to Umbeck's theory of force. Without a redistribution of power, redistribution of wealth will suffer from compliance problems.

6.2 POLICY IMPLICATIONS

The thesis mainly documented the relationship among force, the distribution of wealth and the incentives to abide by the treaties during the settlement of the Ontario Peninsula. The relationship suggests that any program or policy that re-distribute wealth among individuals, or group of individuals, must take into account the distribution of power among the affected parties. A policy that distributes to individuals less wealth than they could have through the use of their own force will be a costly failure.

The 1982 Constitution and the Provincial Court ruling, Regina vs. Jones 1993, gave the Native people priority in fishing rights. This priority is equivalent to entitling the Native people with a bigger share in the fishing quotas. A transfer of quota from the commercial and sport fishing quota, due to conservation measures must satisfy the increase in the Native's share. The provincial ruling does not provide the more powerful interest group, the sport fisherman, (the relative form of power being political power) with the incentives to abide by the recognized treaty and aboriginal rights.

As policy implications, some sort of compensation (even though they do not have the legal rights) must be provided for the commercial and sport fishermen for the loss of their fishing privileges. Second, the native people must gain some political power or support for their re-gained rights. Such support could increase the cost of non-compliance for the sport fishermen. For example, the gain for the sport fishermen from the fishery can be outweighed by a public disapproval of their infringement on the Native people's rights.

6.3 LITERATURE CONTRIBUTIONS AND FURTHER RESEARCH

Umbeck (1981), in his model, does not differentiate the labor time in mining and the labor time in fighting in the production function of gold. Labor time in fighting produces exclusivity over a unit of land. It does not produce or extract gold. In order to circumvent this technical issue this study develops a different model based on the opportunity cost of fighting and fishing. The model used the costs and benefits associated with a unit of time spent in fighting.

Umbeck concluded that the California gold rush of 1848 was not a good test of the theory of force, because the observed variance in the ability to use force was insignificant among the miners. To actually test the importance of force we need to find a situation where the variance in the use of force is relatively large. This study has found a situation where the variance was relatively large and tested Umbeck's theory of force to determine whether the most forceful party received more wealth then those who were relatively weak

Umbeck's theory of force, however, does not take into consideration the social informal rules such as ideologies, values and norms. Even though an individual is the most powerful, he may not choose to forcefully take resources from the relatively weak. In the same context the more powerful may choose to give some of their wealth to the relatively weak. A more complete theory of the distribution of rights must encompass the human and social factors, such as moral values and altruism. This study may be further enhanced by including such factors into the theory of property right formation and distribution.

REFERENCES

Aborigines' Protection Society. 1843. *Tract Relative to the Aborigines.* London.

Alston et al. 1996. Empirical Studies in Institutional Change.

Anderson, T. L. and Hill. P. J. (1975). "The Evolution of Property Rights: A study of the American West." *Journal of Law and Economics* 18(1),163-179.

Anonymous. "Goderich and its Vicinity," *Huron Signal*, Vol. 1, no. 2, February 11, 1848, pp.2

Archives of Ontario. 1856. *Copies or Extracts of Recent Correspondence Respecting Alterations in the Organization of the Indian Department in Canada.* Colonial Office, May 1856

Barzel, Yoram.1989. *Economic Analysis of Property Rights.* Cambridge: Cambridge University Press.

Benson, B. L., 1990. *Justice without the State. The Enterprise of Law.* Pacific Research Institute for Public Policy.

Bromley, D. W. 1989. *Economic Interests and Institutions.* Oxford: Basil Blackwell.

Buchanan, J. M. *Explorations into Constitutional Economics.* Texas A&M University Press.

Calabresi, Guido and A. Douglas Melamed. 1972. "Property Rules and Inalienability: One view of the Cathedral." *Harvard Law Review*.85 (1972):1089-1128.

Canada, *Census of Canada, 1871.*

Canada 1854, *"Report on the Affairs of the Indians in Canada," Section I, Journals of the Legislative Assembly of Canada,* 1844-1845, Appendix E.E.E.

Caniff, William. 1869. The Settlement of Upper Canada, Toronto: Dubley and Burn.

Cape Croker Archives, Land Sale Records.

Coase, R.,H., 1960. "The Problem of Social Cost." *Journal of Law and Economics* Vol.III, October 1960, 1-44.

Demsetz, Harold. "Toward a Theory of Property Rights." *American Economic Review* 57(May 1967):347-59.

Eggerston, T., 1991. *Economic Behavior and Institutions*. Cambridge [England]; New York: Cambridge University Press.

Epstein, R. A., 1993. *Bargaining with the State*. Princeton University Press.

Field, B. C., 1986. "Induced Changes in Property Rights Institutions." Research paper. Amherst: Department of Agricultural and Resource Economics, University of Massachusetts.

Fox, G. and Ivy, M. 1998. "Four Economic Theories of Property Rights," *The Taking of Private Property by Regulation: An Economic Analysis*. Forthcoming book

Griffin, R.C. 1991. "The Welfare Analytics of Transaction Costs, Externalities, and Institutional Choice." *American Journal of Agricultural Economics* 73 Aug.:601-14.

Harper, Allen G. "Canada's Indian Administration: Basic Concepts and Objectives," *American Indigena* 4(2) (April 1945): 129

Hartwick, J., *Economics of Natural Resource Use*, New York, NY: Harper and Row, 1986.

Higgs, R. "Legally Induced Technical Regress in the Washington Salmon Fishery." *Research in Economic History* 7 (1982) 55-86.

James Evans, "The Dairy of James Evans, July 11-August 30, 1838," *Northward Journal*, no. 44, 1988, 11

Johnsen, D. B. "The Formation of Property Rights among The Southern Kwakiutl Indians." Journal of Legal Studies. Vol. XV (January 1986)

Johnson, R. N., and Libecap, G. D. "Contracting Problems and Regulations: The Case of the Fishery." *American Economic Review* 72 (1982): 1005-22.

Letter of Chief Wahbahdick to Colonial Secretary, (10 June 1843) National Archives of Canada Record Group 11.3 Vol. 538 "w" Bundle, 1843-44, Reel C-2962

Leuck, Dean. 1989. " The Economic Nature of Wildlife Law." *Journal of Legal Studies*. Vol. XVIII (June 1989).

Libecap, G. 1989. *Contracting for Property Rights*. Cambridge; New York: Cambridge University Press.

----------.1986. "Property Rights in Economic History: Implications for Research." *Explorations in Economic History* 23 (1986):227-52.

----------. 1981. "Bureaucratic Opposition to the Assignment of Property Rights: Overgrazing on the Western Range." Journal of Economic History. 41 (1), 151-158.

MacAuley, J. B., *Report: Describing Various Aspects of Indian Affairs in Upper Canada*, 1839. National Archives of Canada Record Group 10 vol. 719, Reel 13, 411.

MacCullough. 1989. *The Commercial Fishery of the Canadian Great Lakes*. Ministry of Supply and Services Canada.

MacPherson, C., B., 1973. *Democratic Theory*. Oxford: Clarendon Press.

McManus, John C. 1972. "An Economic Analysis of Indian Behavior in the North American Fur Trade." *Journal of Economic History* 32 (March, No. 1): 36-53
Norman.1986. *Atlas of Great Lakes Indian History*. University of Oklahoma Press.

North, D. C., & Thomas, R. P., 1977. "The First Economic Revolution." *Economic History Review 30*, second series (No. 2): 229-241.

Ontario Reports. 1993. 14. O.R.(3d). *Regina v. Jones* et al.

Pearse. "Property Rights and the Development of Natural Resource Policies in Canada" *Canadian Public Policy* XIV:3:307-320.

Petition on Behalf of the Tribe at Saugeen undated-circa 1839, National Archives of Canada Record Group 10 vol. 127.

Reid, J. D., Jr. (1977), "On Understanding Political Events in the New Economic History." *Journal of Economic History* 37(2), 302-328.

Rhodes, T. C. and Wilson, P.N. "Sky Islands, Squirrels, and Scopes: The Political Economy of an Environmental Conflict." *Land Economics*, 71(1) 106-21.

Samuels, W. J. 1971. "Interrelations Between Legal and Economic Processes." *Journal of Law and Economics* (14) 435.

Schmalz, P. S. 1991. *The Ojibway of Southern Ontario*. University of Toronto Press.

Umbeck, John. "Might Makes Right: A Theory of the Formation and Initial Distribution of Property Rights." *Economic Inquiry* 19(1981): 38-58.

Valpy, Michael. 1996. "Bullying the Chippewas over Fish," *The Globe and Mail*, July 9.