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The Evolutionary Theory of the State: Concept, Causality and Entrepreneurship

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Introduction

This book is based on the following fundamental truths and categorical frameworks: Firstly, the state is one form of the society. Secondly, the society is the substance which exists to fulfill the common purposes of its members, which it is hard for an organ individual to achieve. Thirdly, Homo sapiens have several means to acquire necessities for survival. Fourthly, though they have also the homeostasis mechanisms which are combined in a "Russian doll" way with hierarchies, human behaviors motivated by the selfishness of an individual organ or those behaviors programmed to promote the survival conditions of an individual organ are quite often in contradiction with those driven by the selfishness of the genes or those programmed to promote the long-run survival of the genes. This is because the living conditions or environments after the migration from Africa are not the same as those to which the genes developed to adapt. Fifthly, the individualist organs who became conscious of the contradiction mentioned above have been applying the cognitive mechanisms to filling the gap between the individualist organ and the long-run self-interest seeking genes.

Based on those fundamentals, I derive the synthetic propositions on the state and on the collective action problem intervening public arenas and market arenas. They are classified into those on the state and those on the collective action problem, and each is summed up below, in turn.

The Synthetic Propositions on the State

The first one is on the essential concept of the state. The synthetic proposition on it is that the state should be recognized as one societal form or an artificial organ with an obligation to fulfill those common purposes. As a corollary of this proposition, the "legitimacy of the power" is definitely conceptualized as follows: only if the ultimate purposes of the society are fulfilled by exercising the state's power irrespective of the motives of a person in power, the exercise of the power is recognized to be legitimate.

The second one is on the criteria for judging a difference between the state and other societal forms such as the tribe-communities and chiefdom preceding the state — strictly speaking, the early stat. The synthetic proposition on it is the following: Firstly, the state is distinguished from the preceding kin-based communities by a change in military system from stone weapon system into metal weapon system. In particular, the early state is distinguished from kin-based communities by a bronze weapon system. Secondly, the state is discerned from the chiefdom by a change in the means of acquisition, from a war for plunder into a conquest for regular rule. An innovative change in the military system from a stone weapon system into a bronze weapon system brought about a change in the means of acquisition from peaceful trade to violent looting and, as a result, the bronze revolution brought about a change in the societal form from tribe community into the chiefdom. Furthermore, the application of the bronze revolution to production processes in conquered territories brought about a change in the exploitation from capricious looting to regular rule, and as a result, the early state emerged from the preceding chiefdom.

The third one is on the criteria for judging differences among various types of the state. The synthetic proposition on it is as follows: The type of the state is determined by the combination of a political-military van guard group with the main economic groups with the economic power to financially support and maintain the van guard group. The main economic groups are those engaged in the leading economic sectors of the age.

The fourth one is on the causality. The synthetic proposition on the causality is that the emergence of any societal form should be explicated under the causality category of Kant and Aristotle, which is comprised of the existing conditions, the external shock factors, the motives of the leading or ruling groups, and the results.

The fifth is on the political-military entrepreneurship. The political-military entrepreneurs are indispensable for the process of building any type of the state. They are classified into a power-seeker type and a state-man type. The difference is caused by a difference in the ways to solve the hold-up problem with which any candidate for the political-military entrepreneur is faced in

the process of organizing the main group-members. Whilst the power-seeker type who is observed in the process of building an original state is motivated to undertake political-military enterprises by big gains obtainable from grubbing the power, the state-man type who is observed in the process of building a peripheral state is driven to set out into a state-building enterprise by some emotional mechanisms.

The Synthetic Propositions on the Collective Action Problem

In the second part of this book, it is shown how the collective action problems which arise particularly in the arenas intervening between politics and markets can be solved by the means of various voluntary schemes. The traditional models based on the by-product theory of public goods are refined not only by regarding the social entrepreneur as a key player in any voluntary scheme to solve the collective action problem, but also by emphasizing that it is rational for the social entrepreneur to be subjugated to the "not-for-profit" constraints. Although the social entrepreneur has to play key roles in any collective action, it have been overlooked by the proponents of the traditional voluntary schemes such as the private provision of public good, the voluntary contributions, and the private good-cum-public good. In this book, I focused on the following three topics which are considered to be relevant to the governance of a state: the first one is on the incentive problem of an entrepreneurial type of social organizers including political entrepreneur as well as social entrepreneur, the second is on the indispensability of both social entrepreneur and not-for-profit organization for undertaking any voluntary-contributions scheme, and the third is on the private good-cum-public good which is one of the applications of the Olson's by-product theory. The main propositions derived from refining the traditional models are summed up below.

The first synthetic proposition is on the personal requisites for the social entrepreneur. The main conclusion is that not only skills and talents for the organizing work and the managing work but also the high evaluation on long-run interests are requisites for the social entrepreneur.

The second are on the rational not-for-profit constraint. The main

conclusion is that social entrepreneur accepts the not-for-profit constraint in order to overcome the agent problem which arises in the process of providing collective goods or achieving the common interests of a large group. In the sense that the not-for-profit constraint is adopted for the sake of contributing to the self-interests of a social entrepreneur, it is rational to accept it.

The third proposition is on the incentive problem on the way to non-market activities. The incomplete-contract problem has to be solved in order to induce a political entrepreneur type of social organizers to take the initiative in achieving the common interests of a large group, since it arises in the process of organizing the members of a large group before realizing the common interests. This hold-up problem is solved by applying the property rights approach. It is inferred from the analytical results that the ownership to non-human capitals required for political activities for collective action should be given to political entrepreneurs.

The motives for writing this book and the main methodological contents are in what follows.

The state has been so long an antinomic puzzle in the sense that everyone seems to be able to give some solution to it but many of the provisional solutions are usually misleading. It is because whilst it is easy to make an ideal image of the state based on every day's experiences, the state is an objective social organization the essence of which cannot understood without profound cognitive works based on empirical data in various academic fields. The traditional theories of the state are could not go beyond the limits of those data. On the other hand, some popular opinion leaders in recent years such as Ridley, Fukushima and Gat have been attempting to present new hypotheses on human history based on new empirical works in those wide-ranging academic fields. Never the less, their hypotheses on the state are based on some of the traditional theories and therefore, cannot be called "true" theory. What do the traditional theories of the state lack to be called a "true theory? It is the following two missing links: The first one is the cognitive frameworks which can subsume not only the relation between the state and other societal

forms but also the relation between one type of the state and other types in a consistent way. The second is propositions on the bio-sociological relation between an organ individual with the society itself. Both require the categorical frameworks which not only distinguish the substance from the accidental phenomena but also explain causality. Without filling these missing links with such categorical frameworks as to be able to subsume new empirical data relevant to the state, we can neither understand the "concept of the state"—the synthetic propositions explicating what the state is—nor the "causality of the state"—the synthetic propositions explicating why and how it comes into being and in what respects one type of the state is distinguished from others. In this book, I seek those categorical frameworks in the Kantian cognitive philosophy, try to found the theory of the state on those empirical data subsumed under the Kantian categorical frameworks and derive new synthetic propositions on the state, called the "evolutionary theory" of the state.

Here, I have to say in advance a notice on the criteria for judging the truth of a synthetic proposition and ask for a permission to say on the limits of truth judgment. As well known, it is almost impossible to corroborate many synthetic propositions of social sciences by resorting to artificially well-designed experiments. I tried to bring the level of truth judgment into line with the one of natural sciences not only by deriving analytical propositions from the analysis of an individualistic game model formulating the main synthetic propositions, but also by applying the main propositions to as many historical examples as possible. In this sense, the theme of this book is political and historical, but the methods are economic and mathematical.

The main texts of this book consist of two parts, the main contents of each of which are as follows, below.

In the first part of this book, the main synthetic propositions on the state are derived and corroborated by the analysis of some game models abstracting from the essential characteristics of those propositions. Furthermore, it is shown that those synthetic propositions are applicable to various types of the state appearing on the historical stages. The main contents of the first part are in what follows below.

First of all, in accordance with the Kantian category of the "substance and accident" relation, the state is distinguished from the "society itself" and the former is recognized as an accidental form of the "society as the substance." It can prove why the traditional theories of the state have been confusing the state with the society so long. That is, it shows that it is because they have not subsumed the state under this categorical framework. Since, according to the Kantian substance and accident category, the state can be recognized as an accidental form of the society, the concept of the state is defined properly not only in the sense that it is distinguished from the preceding kin-based communities but also that various types of the states appearing on human history can be discerned from one another.

Secondly, based on the Kantian causality category aided by Aristotle's metaphysics, why and how the origins of the state—an early state—comes into being can be explicated in line with the series of logical procedure which factorize relevant phenomena into the existing conditions, external shock-factors, motives and results. Furthermore, a difference between one type of the state and others is also explicated by comparing those essential factors. I try to show that the Kantian causality category is also applicable to explicating why and how all types of the states appearing on human history come into existence. Whilst the main synthetic propositions on the concept of the state—the propositions explicating what the state is—are summarized as General Theorem 1, those on the causality of the state—the propositions explaining why and how one type of the state come into being are summarized as General Theorem 2. Furthermore, in order to corroborate those propositions, some game models grasping the main characteristics of relevant societal forms are formulated and are analyzed in order to derive analytical propositions as the necessary conditions.

Thirdly, I try to solve the unsolved problem of collective action, that is, the problem of "who undertakes the risky and costly historical enterprise of building a state." It remains an unsolved question, if judged from the view point of the logic of collective action. I classify those state-building entrepreneurs into two types of political-military entrepreneurs named "Machiavelli type" and "Platonic type". Whilst the first type emerges in the

circumstance where a struggle for power is described by race game, the second one emerges under the condition that political circumstances are in waiting game. I lay the foundation for the emergence of the second type by taking into consideration the emotional mechanisms which drive Homo sapiens to take protective behaviors, as well as by putting the process of the power-struggle in a dynamic perspective.

In the second part of this book, individualistic actions in political or non-market arenas are examined. Those actions serve as a bridge between politicians and citizens, between a ruling group and the ruled one or between power-seeking activities and economic ones. Though, however, they are indispensable for the decision-making and exercise of government policy, the problem of "who takes on the work to organize those actions" remains to be solved. It is the problem caused by the motives for free-riding on someone's organizing work. On the other hand, the Olson's by-product theory could answer to the following question, "Why can the common interests of a large group be realized in spite of their being of a public good nature? " However, it does not solve the following problem, "Why is someone willing to take the initiative in achieving those common interests or in organizing the large group into a cooperative collective action?" In this book, I try to solve this second question by analyzing a dynamic waiting game formulating the individualistic activities in non-market arenas. That game model is designed to grasp the main characteristics of the process of coordinating the members of a large group in a cooperative way. The social entrepreneur is taken up as the key player in the collective action. That concept has been overlooked by the "by-product theory" of public good or the" selective-incentives schemes." Furthermore, I argue that the social entrepreneur is also the key player of not-for-profit firms and make up for a defect in the rational theory of "not-for-profit" organizations by filling it in. I present an alternative logic of the rational not-for-profit constraint.

The main contents of the second part are as follows below.

Firstly, in order to explain the incentives of a political entrepreneur type of social organizers for taking the initiative in organizing a collective action, an incomplete-contract model is presented. It is an application of the

property-rights approach to political or non-market arenas.

Secondly, the voluntary-contributions scheme undertaken by social entrepreneur is formulated, and what type of person is the first to take the initiative in undertaking the voluntary-contributions scheme for the private provision of public good.

Thirdly, in the similar dynamic setting, an "eco-good business" model is formulated and the same results as the voluntary scheme above mentioned are derived by analyzing the dynamic game to describe the process of providing a public good by the means of the eco-good business. The eco-good is one of the "private good-cum-public good."

I ask here, if permissible, the readers of this book to allow me to talk about the academic process of preparing for this book, and to say about special acknowledgements. I entered into the academic field addressing the state in the process of studying the British theory of income distributions. It is because the redistributions by way of the exercise of the state's power are influential on the actual level of disposable income. Then, the state became one of the key factors to determine the actual income distributions. I began this new work with studying the public choice theory. The theories of the state on which this school is based are the contract theory in the Hobbesian tradition and the rational-bandits hypothesis. Though they grasp some essential factors of the state, not only the concept but also the causality was not considered to be in full consistence with the reality of human history. The state did not allow me to address important topics relevant to it in a provisional way. This book is an outcome I can present at this point of time, and I am conscious of its being still in the work in progress.

I owe to many predecessors and friends for this book, too many to cite all. I ask them to pardon me to limit expressing my special gratitude to my former professors at Kobe University and many friendly members of PCS, EPCS, and JPCS, all of whom have been giving me academic impetus.

Part 1

The Theory of the State

Chapter 1
The Evolutionary Theory of the Origins of the State: the Concept and Causality

As a result of adaption to the First Bronze Revolution, early states emerged from kin-based communities through the intermediate stage of chiefdom. An increase in the net-benefits to a military entrepreneur type of those traditional community's war leaders of adaption to the bronze revolution motivated them to finance the cost of armed force at their expense and to change the traditional kin-based community into the chiefdom. Furthermore, when it became rational to rule rather than to loot subjugated territory, the chieftains were motivated to change the chiefdom system into an early state. Since, however, the early state is also one form of the society, in order for an early kingship to claim the legitimacy of the power it had to fulfill the ultimate purposes of the society itself. The main synthetic propositions on the early state are generalized to the two general theorems, with a view to application to other types of the state in the second chapter.

1. Introduction

As a result of adaption to the First Bronze Revolution,[1] an early state[2] emerged from the preceding kin-based communities networked by external trades in the last stage of the Neolithic Age, through an intermediate stage

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[1] According to the archaeological study of Muhly (1995), the bronze—strictly speaking, an alloy comprised of ninety percent of copper and ten percent of tin —were used in the Mesopotamia area in the last half of the BC 3000s for the first time in human history, though the place where it was developed in the first is not specified yet.

[2] As to the theoretical and empirical study on the early state, see Claessen and Stalik (1978; 1981), though their concept of the early state is different from the one of this paper, in the sense that they did not give the concept of the state but only picked up some characteristics of the state.

named the chiefdom.[3] The bronze innovations in both military and economic technology motivated a military-entrepreneur type of war leaders to finance not only the cost of armed force but also that of governance at their own expense. Such a process of an early-state building is explicated in a consisting way if subsumed under the Kantian causality-relation category. On the other hand, the traditional theories of the state failed to present consistent synthetic propositions explaining "why and how the state came into being"[4]

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[3] See Service (1971), as to the concept of the chiefdom.

[4] The causality hypotheses on the state presented by the traditional theories can be classified into the two major groups, called the contract theory and the predatory theory. The modern version of the former is now represented by Rawls (1971, 2001), Nozick (1974) and Buchanan (1975) based on the individualistic approach. They are in common based on the state of nature of an ahistorical individualistic type in the philosophical tradition of Locke and Hobbes in the17th century, which was modified in a more enlightened way by Spinoza (1677), Hutcheson (1747) and Hume (1752), and furthermore modified in a radical way by Rousseau (1762) in the sense that he insists the "general will" has to be represented by the petty bourgeois class as well as well-off bourgeois class. Hardin(1995) belongs to the contract theory but distinguished from others by his emphasizing the plus-sum benefits which exist objectively without cooperation. On the other hand, the latter—predatory theory—is represented by the Marxian exploit theory (Engels, 1878;1884) based on the empirical work of Morgan (1877), the conquest theory of Oppenheimer (1926), the "rational bandits" theory of Olson(1993; 2000), McGire and Olson 1996)), and Kurrild-Klitgaard and Svendsen (2003), the predecessor of all of whom is the "pirate model" of St. Augustus (Augustine,1967). Furthermore, the North's transaction-cost approach (1981), the conflict models of Skaperdas (1992) and Hirshleifer (2001), and Moselle and Polak (2001) also may belong to the contract theory. The circumstance hypothesis of the Caneiro (1970) should be also subsumed in the latter group. However, whilst the contract theory is *de facto* the logic to justify the legitimacy of the state's power, the predatory theory focuses on one process of building a state, that is, on the topic of whether it was begun with conquest war or not, and on the motives for the "power to enforce". They emphasize the selfish motives of power-seeking subjects. Therefore, though the arguments between both sides may seem antagonistic, they are in fact at cross-purposes. Plato (1941), Aristotle (1946, 1975) and Hegel (1824/25, 1807)) are some

(hereafter, the causality of the state). It is not only because they could not yet take important archaeological and anthropological facts into due consideration, but also because they did not explicitly subsume their logic under the Kantian causality-relation category.[5]

"What the state is" (henceforth, the concept of the state, for short) has been also one of the unsolved theoretical problems with the theory of the state. If, however, synthetic propositions on the concept of the state are subsumed under the Kantian category of the "substance and accident" relation, the state is recognized as one accidental form of the society. It is why the exercise of the state's power has been *de facto* legitimatized by fulfilling the ultimate purposes of the society. However, the traditional theories did not subsume the concept of the state consistently in the above Kantian categorical framework, and therefore, they could not distinguish the state from other societal forms as well as they could not discern various forms of the states, let alone their disregard for the relevant archaeological and anthropological facts. [6] Any societal form other than the state and chiefdom maintains more or less the power to enforce for the ultimate purposes of the society, one of which is to

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exceptions in the sense that they regard the state as a social entity locating on the top stage of the historical development of communities, though they could not derive the causality relations on the origins of the state. Hume (1752) and Ortega (1921; 1930) are unique in separating how state-building was begun from how the state should be ruled.

[5] As to the cognitive philosophy of Kant, see Kant (1787; 1800; 1912).

[6] For example, the traditional definitions of the state in common include explicitly or implicitly the conceptual proposition that the state is a social organization with an effective monopoly in the legitimated or justified violent power, by following the conceptualization of Weber (1911). However, the violence or armed force as the last resort to the "legitimated power to enforce" was more or less provided also by kin-based communities, even by primitive communities, as well as the chiefdom. As to the empirical study of the wars among the kin-based communities, see Chagnon (1974), Knauf (1991), Boehm (1993) and Gat (2008). The "continuity principle" of Lowie (1962) is also based on the same failure in distinguishing the form of the society with the society itself. On the other hand, Fukuyama (2011) misleads us into recognizing the state as the centralized political system of an empire-state type.

protect its members from external and internal threats. Therefore, in order to distinguish one form of the society form others, it is necessary to clarify who finance the cost of the enforcing power and who organize those members into an armed force.

Furthermore, the synthetic propositions explicating what factors determine the territory size of a state or why various forms of the society coexist in the same period (hereafter, the "interrelationship of the state") cannot not be derived without subsuming those propositions under the Kantian interrelation category. It is why, though the "benefit and cost" approach[7] is useful for the determination of a territory size, it could not explain why various forms of the society co-exist in the same period.

Therefore, not only the causality of the state but also the concept and interrelationship of the state must be begun with answering the following question: what the ultimate purposes of the society are or why the society exists.

In this chapter, by taking the relevant archaeological and anthropological facts into consideration and by subsuming those synthetic propositions on the state under the Kantian categorical frameworks,[8] the one of the following three unresolved theoretical problems with the state are solved: The first problem is on the concept, causality and interrelationship of the early state,[9] and the second one is on how to discern various forms of the state appearing on the historical stages. This latter problem is solved by showing that the main propositions on the early state are applicable to those other forms of the states, *mutatis mutandis*, in the next chapter.

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7 See Alesina ans Spolaore (2005), and Riker (1962; 1964)

8 As to the reevaluation of the Kantian categorical frameworks by the modern neuroscience, see Pinker (1997, 2007).

9 In order to apply to the birthplace of the early state, Ueda (2009; 2011) formulated the process of an early-state building in irrigation communities under the analytical framework of the "link and network" game (Slikker and Nouweland, 2001) and the hierarchical cooperation game (Demange, 2004). The irrigation model of Witfogel (1957) was subsumed under those frameworks. The base model is summarized in the appendix of this paper.

In what follows, this chapter is organized as follows: In the second section the concept of the "society as the substance" is explicated on the basis of biology and neuroscience. In the third section, the empirical backgrounds—the relevant archaeological, anthropological and historical facts—on which the basic assumptions of this paper are based are summarized. In the fourth section the synthetic propositions on the concept of the early state are derived. In the fifth section, the synthetic propositions on the causality and interrelationship of the state are derived.

As long as the state is one form of the society, what follows has to begin with the society itself.

2. The Society and the State: the Substance and its Accidental Form

Homo sapiens organized themselves into various cooperative organizations for the sake of overcoming the problems with which it is hard to tackle only by one individual organ. Those problems are, "How should the innately-programmed behaviors, which are booted up by the genes mechanism but made aware of by the cerebrum cognition, be controlled or reconciled so as to adapt to external conditions different from the environments to which the genes had developed to adapt. [10] The genes mechanisms booting up those innately-programed behaviors are classified

[10] The terminology of the "evolution" adopted in this book is based on the epigenetic theory of the genes mechanisms and the modern emergence hypothesis on mutationism. Its application to the state shares some common spirits with Rubin (2002) titled "Darwinian Politics," though the accidental characteristics of the Darwinian evolution theory are not adopted in this paper. If the society is conceptualized on the basis of the empirical facts of biological and neuroscience study as well as of anthropological and archaeological study, the adjective "evolutionary" in the above sense is inevitable, since the real processes of adaption are replete with phenomena described in the terms of the "evolutionary" theory such as strategic adaption to external shocks, innovative enterprise, entrepreneurship, motives and emotions, inevitability of creative ideas and process standardization of good performances.

into the "emotional affects" and the "instinctive appetites (drives)." Though the former is self-recognized as feelings and the latte as desires (motives), both are the innate programs functioning so as to keep up the homeostasis. They are interrelated in a hierarchical way where the former is in a higher order. Furthermore, each of them is interrelated, in a telescopic way with hierarchies, with sub-conscious mechanisms comprised of metabolism, innate reflection, endocrine, pleasure-displeasure mechanism in the order of the evolutionary development of an organic life. Whilst the emotional programs evolutionally developed to enhance survivability by better coping with external relations with other living-lives, the instinctive programs to better manage to provide an organic life with necessities indispensable for self-preservation and proliferation.[11] Since those genes' programs were evolutionarily developed in the ages of the savanna life, they have not yet developed so as to able to adapt to new environments surrounding the later life of Homo sapiens.[12] Therefore, Homo sapiens have been endeavoring to overcome this gap by resort to the cognitive work of the cerebrum and to the will power under apperception.

Straight goal-catching behaviors booted up by those two programs can be consciously controlled, within a range subjected to the sub-systems' constraints, so as to be reconciled with the external conditions such as social circumstances and/or natural environments to which the cognitive work of the cerebrum induces an individual organ to adapt. Furthermore, the will power under apperception leads him to stick to behaviors induced by the cognitive work, until desired results are brought about.[13] The survival of an individual organ and its offspring depends firstly on how much they are protected from external threats and secondly on how satisfactorily they are

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[11] See Damasio (2003). As to the pioneering empirical work on the functions of emotions, see Frank (1988), Le Doux (1996) and Damasio (1993; 1999).

[12] This proposition is quoted from Ridley (1997), but I am not sure who derived it in the first.

[13] Libet (1985) presented the empirical evidence to show that behaviors going against the will can be stopped before 200~300 milliseconds, though the behavior mechanism begins working prior to the conscious decision-making.

provided with necessities for survival. However, it is hard for one individual organ to achieve those goals, even if the emotional mechanisms and the instinct ones drive each individual organ to pursue the goals. The society was formed in order to bridge a gap between the final purposes of each individual organ and his capability to achieve them.

Therefore, the ultimate purposes of the society are to achieve the targeted goals of those behaviors booted up by the homeostatic functions with some room for conscious discretion on the assumption that its possibility is assured by the experiments of Libet. They are classified to three as follows below.

The first ultimate purpose is to achieve the goal of the "behaviors affected by the emotional programs," which evolutionally developed to so as to enhance physical survivability by protection of an individual organ and its offspring from external threats and by well-dealing with interpersonal relationship inside a group.

The second is to achieve the goal of the "behaviors driven by the instinctive programs," which evolutionally developed so as to be contributive to the purpose of keeping-up the inner subsystems of an individual organ and its offspring. Both purposes are fulfilled by coordinating those individuals into a cooperatively-working organization so as to raise the achieved level of the targeted goals of the individual behaviors at least to the survivability level.

Finally, the third ultimate purpose of the society is derived from the above two. It is to maintain institutional systems under which those cooperative organizations are maintained so as to promote cooperative behaviors. This third is required because those cooperative behaviors are often in contradiction with the innate behaviors driven by the sub-conscious mechanism of "pleasure and displeasure" associated with those cooperative behaviors. In other word, the latter behaviors may contradict with the "goal of the selfish genes" pursing their long-run survival. Since an organic individual is an "agent" who is self-conscious of his own emotional affections and instinctive appetites, and has some discretion to behave freely from the goal of the "selfish genes as a principal," the agent can and is willing to allow his egoism to take precedence over the selfishness of the genes, whenever the "egoism of an organic individual" contradicts with the "selfishness of the

genes."[14] This contradiction must be overcome somehow. It can be done by maintaining proper institutional systems. Such systems are comprised of formal rules, customs and the ethical codes to which the secondary emotional mechanisms affect each individual to adhere. From the empirical view point of neurosciences and biology, the modern proponents of social norms and ethical codes who appeal to those secondary emotions for maintaining social stability put their arguments on the human nature which is not in contradiction with the innate emotional mechanisms of Homo Sapience.[15] That the individualist pioneers of those proponents represented by Hutcheson (1747) and Smith (1759) were right can be corroborated by the empirical works of modern neuroscience and biology.

As well as "what the purposes are," "how they are fulfilled" is important. I have to mention on the means to fulfill the ultimate purposes or to actualize the targeted goals of the society. It is because as long as the ultimate purposes are the same among all forms of the society, "how to achieve them" should be key factor in the determinants of various societal forms. The key factors are divided into two, as following below.

The first means is the power to enforce. Though it seems to be common sense, it should be kept in mind that all forms of the society have more or less the "enforcing power" which works to maintain formal institutional systems as well as to protect the members of a society from any violent threat. The enforcing power functions as the last resort or *ultra ratio*. Therefore, various forms of the society cannot be distinguished mere by the existence of the enforcing power, and therefore, should be distinguished by "how to generate the enforcing power," i.e., by who undertakes financing the cost to generate the power to enforce or the armed force and by who organizes a group of members into one organ with the enforcing power.

The second means is relevant to "how to acquire necessities." Although it is also common sense, it should be kept in mind that Homo sapiens have four

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[14] See Maki (2008).

[15] As to the secondary emotions and its functions in promoting cooperative behaviors, see Turner (2000), Thagard (2010) and Batson (2011).

kinds of the means to acquire necessities indispensable for achieving, in particular, the second ultimate purpose of the society. They are as follows: the first means is to acquire those necessities by their own production work, the second by trades, the third by plunder and the fourth is by "rule"[16] under which tributes or taxes are regularly paid by the ruled people in return for protection from capricious plunder and violent threats from inside and outside. Which one is chosen depends on which of the above four means brings about the largest net-benefits. The state is the societal form in which it became rational to adopt the fourth means of acquisition, i.e., the acquisition by rule, in those four means.

Therefore, the image of the "states of nature" [17] should not be fixed, although political philosophers in the Enlightenment age tend to image the violence-oriented anarchy which is based on recognizing the human nature to be individualistic and egoistic. Even now, however, the modern political

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[16] As to the meaning and means of the rule, see Ortega (1930), pp.92-93. Regarding the means of the rule, see Spinoza (1677), pp.295. Ortega emphasized that the rule must not be recognized as physical enforcement by the use of the power, but should be the "legitimate use of the authority" which is supported by public opinion. On the other hand, Spinoza classified the means of the rule into the following two: the first is the rule by physical force —for instance, physical binding and deprivation of counteroffensive means— and the second is the rule by mental manipulations—for example, giving incentives and threats to the ruled people so that they are willing to support the use of the power. To sum up, the rule is the use of the legitimate power which is corroborated by the conceding of the ruled people, and in order for them to concede, the state have to be able to assure them of their survival conditions. Whilst the incentives and threats taken up by Spinoza are an example for the means of satisfying the instinctive desires, the physical force is the means of assuring them of the first purpose of the society (the emotional affections) represented by defense and protection.

[17] In spite of no explicit specification, the justification by the natural laws does not contradict with the justification by the ultimate purposes of the society. The former may be considered to be subsumed under the latter. Such an implicit relation between them is also observed in the justification by Plate, Aristotle, Kant and Hegel (1824/25).

theories of international relations in the tradition of the Enlightenment age tend to stick to the three types of fixed images as follows: the "realist" based in the Hobbesian tradition,[18] the "idealist" in the liberalist tradition[19] and the "international anarchist" based on the Grotius internationalism.[20]

3. Empirical Bases

There are three empirical facts which should be noted in order to explicate the concept and causality of the state: The first fact is that war is a general phenomenon in human history. The second is that wide-spread external trades among kin-based communities preceding the chiefdom had been prevailing prior to the process of early- state building. The third is that the time period in which early states emerged temporally overlaps the time period in which the First Bronze Revolution arose.

The first fact above mentioned contradicts with the basic assumption of the traditional theories of the state, since they recognize the essence of the state as a "social organization with a relative monopoly in the legitimate violent power"[21] and the armed force for war was "legitimately" mobilized and resorted to —in the sense that it is done so based on agreements—even by many primitive communities.

The second fact contradicts with the assumption of both the predatory theory of the state and the contract one, as long as both assume that a conquest war breaks out among autarkic groups or individuals without a

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[18] It is represented by Morgenthow (1978) and Waltz (1979, 2001).

[19] Furthermore, the liberalist images are ramified into the international interventionists such as Kant, Cobden and Bright and the international interventionists represented by Woodrow Wilson. As to this classification of the liberalist images, see Waltz (2001).

[20] The notion of the anarchic international society is represented by Bull (1995). The last two notions are considered as a ramification of the Enlightenment originating in the rational and spontaneous image of economic activities.

[21] This conceptualization has been authorized and popular, since Weber (1911) defined the state in accordance with it.

network of the division of work. More concretely speaking, those traditional theories did not take it into due consideration that prior to engaging in warfare, the winner side and the loser one had been more or less networked through external trades.

The third has been neglected by the traditional theories.[22] Due to this negligence, they could not explain why the state did not emerge in the stone-ages but came into being in the first stage of the Bronze Revolution for the first time in human history. This section focuses on the relevance of those empirical facts to the evolution approach to the state.

3.1 War and Force as General Phenomena in Human History

As to the concept of the state, the traditional theories of the state in common recognize the state as a social organization with the "power to enforce" generated by an effective monopoly in the legitimated violence. The use of the state's power, if conceded by the ruled members, has been called the legitimate power in the jargon of political philosophy. This concept of the state is based on the hypothesis that only a societal form called the state has legitimate armed force. However, the empirical study of evolution anthropology pioneered by Chagnon (1974) revealed that even primitive band-communities regularly mobilized the main male members into an armed force not only with the aim of acquiring their necessities such as a means of livelihood and female partners but also with the aim of defensing against external threats. Furthermore, it is well known that many of the traditional tribe-communities mobilized a group of qualified male members into an armed forth for the purpose of aggression as well as defense.[23] Those

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[22] Some exceptions are, Plato who recognizes the state (polis) as a political organization to deal with extended economic division of work, Hegel who builds the state on the basis of the civil communities and Ortega who recognizes the process of building a state as adaption to historically new circumstances.

[23] See Gat (2008) and Wade (2006). As to the empirical study, see Knauf (1991), Boehm (1999) and Carneiro (2000).

facts contradict the above assumption of the traditional theories — the proposition that a relative monopoly in the legitimate violence is the essential factor of the state by which it is distinguished from other societal forms.

As was mentioned in the previous section, the existence of the enforcing power is common to various forms of the society, and the last resort of the enforcing power is violence, though how it is generated and used is dependents on societal form. It is because a relative monopoly in the violence works as the last resort to the" power to enforce." In other word, the former gives physical guarantee to the latter. Therefore, the legitimate monopoly in the violence is one factor of the "society", but not of the state. The contradiction of the traditional concept of the state with those empirical facts convinces us that it is necessary to take other factors into allowance in order to explain the concept of the state.

3.2 A Widespread Network of External Trade among Kin-based Communities

It is well known that kin-based communities including even primitive ones such as Aborigines in the Paleolithic ages were engaged in inter-community trades.[24] In particular, the tribe-communities prior to the historical process of building an early state in Mesopotamia had been networked by way of external trades widely spreading among the Afghan, Indus, Red Sea, Anatolia, and Black Sea region.[25] The fortified cities were the commercial-activities center as well as protected residence of those tribe-communities. As some tribe-members who accumulated private wealth through a success in those

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[24] See Ridley (1997, 2010). Furthermore, on how inter-community trades in the stone ages were carried out, see Polanyi (1963; 1977), Sahlins (1972) and Nadel (1999).

[25] As to the anthropological evidences, see Klenge (1983), Jarrige et al.(1995), Possen (2007) and Law (2011). I found out that Fukuyama (2011) and Ridley (2010) criticized the ahistoric individualistic assumption made by the traditional theories of the state and that they emphasize trading networks preceded the process of forming any society.

external trades rose up as "person in economic power," the traditional kin-based communities gradually transformed themselves into a hierarchical community differentiated by wealth ownership. Because external trades in those days were still under anarchy, they were usually accompanied with armed guardians, and actually commercial activities engaged in such an external trade were combined with, and not distinguished from, looting activities. Peaceful transactions in the external trade were guaranteed by an open reveal of guardians' weapons, and the bargaining power—the terms of trade in economics terms— was influenced by the relative power-balance between traders.[26] Since, however, any party engaged in such an external trade was not freed from a stone-weapon system, the power balance was maintained and therefore, the second means of acquisition—the peaceful trade[27]—was chosen on a rational basis rather than the third one—the plunder. If, however, a new condition emerges so that the more powerful the armed forth are, the more wealth they could accumulate privately and thus the more payable to take on the cost of the armed force, then those stake-holders in the external trade were motivated to strengthen their armed force at their expense.

As the bronze innovation was introduced, a new process of destroying the balance of power began in the last stage of the traditional tribe-communities and it opened a way to the chiefdom. However, the chiefdom is not yet a state. In order to motivate chieftains to transform the chiefdom form of the society into an early state, net-benefits gained by plunder had to be exceeded by net-benefits acquired by rule. In order to meet this condition, it is necessary that the net tributes or taxes—collected tributes or taxes less the cost of ruling the subjugated territory at regular periods—are larger at least in a long run than one-off booties gained by a war for plunder. This benefit-cost condition required the chieftains to launch into the governance of the subjugated territories with the aim of bringing about an increase in their economic

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[26] See Polanyi (1963; 1977) and Sahlins (1972).

[27] Needless to say, a surprise raid, if possible, was always an option. See Gat (2008).

productivity.

3.3 The Impacts of the First Bronze Revolution

How to acquire the necessities and means to satisfy drives or appetites booted up by the instinct programs were divided into the four kinds of means as mentioned in the second section. The period when the third means of acquisition and the fourth one—the acquisition by plunder and the one by rule—appeared for the first time in human history is around the same period as, or overlaps with, the period when the First Bronze Revolution arose in the southern part of Mesopotamia. Such a correspondence is typically observed in the Sumerian society in the last stage of the BC 3000s.[28] The Bronze Revolution brought about innovations in both weapon system and production tools. Those innovations are considered to have changed the balance of military power among the kin-based communities equipped with conventional stone weapons to such a level, firstly, that the acquisition by plunder is preferred to that by trade. Furthermore, when applied to the production processes of a conquered territory, those innovations could enhance economic productivities to such a new level that net-benefits gained by rule surpass those gained by looting.

Though the acquisition by rule should be distinguished from the one by plunder in spite of similar appearance, the traditional theories of the state including the modern anthropology failed in distinguishing those two types of acquisition in a consistent way. For example, though the "rational bandits" theory contributed to refining the theory of the state by founding it on the selfish motives of a rational looter, it could neither distinguish the acquisition by plunder from the one by peaceful trade. It is because they did not take those innovations in both weapon system and productive processes brought about by the Bronze Revolution into due consideration, as well as they did not take those widespread external trades as one of the existing condition just prior to an early-state building.

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[28] See Muhly (1995) as to the archaeological evidence.

As long as all warring parties were equipped with stone-made weapons and thus the military technologies were in the same level, the attacking side, if an open attack, also had to suffer from heavy cost and high risk. This is why wars before the First Bronze Revolution took on the characteristics of a surprise raid and at the same time why the acquisition by trade was preferred to the one by plunder, subjected to the condition that the transaction was accompanied with guardians' weapons. When, however, some of the opponent parties could introduce innovative weapons with higher lethality earlier or more efficiently than others, the expected net-benefit of a war increased so much that a war for plunder aimed at war booties became a regular military-enterprise but not a surprise raid. It is the First Bronze Revolution that brought about such a change in the means of acquisition. Such a bronze revolution gave a crucial impact on the traditional tribe-communities, so crucial that the first runners among them transformed the traditional societal into a new societal form called the chiefdom—the historical stage intermediating between the preceding kin-based community and an early state.

However, wars in the chiefdom era still took on the characteristics of looting activities. That is, the purpose of the war was still the acquisition by plunder but not yet the one by regular rule.[29] In order for the purpose of war to change into the acquisition by regular rule, the winner side had to be motivated to apply also a bronze innovation to the production processes of defeated territory. In order to be so-motivated, it was necessary for the economic productivity to increase to such a high level that the revenues obtainable from a tribute or tax system are bigger than the cost to rule or govern the defeated side and as a result, net-benefits gained by rule grow

[29] Wars in the chiefdom are not documented yet, and therefore have to be inferred from other resources such as archaeological study and Homer's works though its military technology reflects the second bronze revolution. As an example of such an inference, see Finley (1978). Furthermore, according to Gat (2008), the origin of the ancient Greek king called "basileus" is traced back to a military-entrepreneur type of war leaders in the last stage of the tribe-community age.

bigger than those by plunder at least in a long run perspective. When this necessary condition was met, the chiefdom was transformed into a new societal form called the "early state" on a rational basis. Looting activities are replaced with legitimate exploiting activities under the rule of an early kingship. It is these impacts of the First Bronze Revolution that all of the traditional theories of the state failed in taking into due consideration. This is why they could not distinguish the state from other forms of the society preceding to the early state, and why, as shown in the seventh section, they could not distinguish one form of the state from other forms in a consistent way.

4. The Concept of the Early State

In what follows, various forms of the society preceding the chiefdom are subsumed *en masse* under the term "kin-based community." The chiefdom which emerged from a tribe-community is intermediate between the early state and the kin-based community.[30] In order to conceptualize the early state in the Kantian framework of the "substance and accident" category, first of all, the chiefdom has to be distinguished from the kin-based community, and then, the early state has to be distinguished from the chiefdom. From what points of view should they distinguished? As long as the kin-based community, the chiefdom and the early state are one form of the society, all of them have to fulfill the final purposes of the society and have the power to enforce as the last resort. Therefore, they are discerned firstly by a difference in "how to generate the enforcing power" and secondly by a difference in "how to acquire necessities for survival" under the institutional systems of each societal form. In this section, the early state is conceptualized by making clear those differences.

4.1 The Chiefdom vs. the Kin-based Community

[30] The concept of the chiefdom is not mere conceptual medium. As to the anthropological study, see Service (1973).

Firstly, the chiefdom is distinguished from the kin-based community by a change in warrior-mobilizing system, i.e., a change from volunteer warriors into hired standing corps. Whilst the "enforcing power" of the kin-based community is, when necessary for a war, generated by mobilizing the main members into a military team organized on an egalitarian principle, the enforcing power of the chiefdom is by the chieftains who take on the cost of the armed force at their own expense. They hire warriors and maintain a standing army system by financing the cost of such a military system at their expenses. Those chieftains originated in the ex-chiefs of the kin-based community or military officers appointed by those chiefs. The chieftains accumulated private property by a success in war-enterprises. The kin-based community gradually changed into a hierarchical organization, but its members were not yet the ruled people in the sense that they are not yet a tribute-payer.

Secondly, though the chieftains engage in external trade and endeavor to maintain a monopoly in the external transaction, they are ready to adopt the means of plunder, if they believe that they overwhelm their trading counterparts in terms of military power. In this sense, the chieftains adopt the means of plunder as a regular means, whilst the kin-based community adopted the means of plunder as a surprise attack and the means of trade as a regular means.

Such a change in the military system was brought about by an increase in the net-benefits obtainable from a war enterprise to such a level that the war leaders of a military-entrepreneur type are motivated to maintain the armed force at their own expense. The profitability of a war enterprise was drastically increased by applying bronze-made innovations to military system, so that the armed force with a bronze-weapon system could defeat the conventional armed force equipped with stone-made weapons at much lower cost than ever. A war-enterprise became an attractive business for venturous military entrepreneurs, since it could pay those war leaders of a military entrepreneur type to adopt the bronze-weapon system at their own expense.

On the other hand, in the kin-based community, war booties had to be distributed on an egalitarian basis among volunteer-warriors joining in a war enterprise. It is because as long as the probability of the stone-made armed force being winning is not high enough, it is not payable to maintain hired warriors equipped with the stone-made weapon system at their expense, and therefore, because each participant in the war enterprise is required to equip himself with stone weapons at his own cost. As a result, there was little room for accumulating private wealth to such an influential level as to have an overwhelming economic power which leads to a relative monopoly in the enforcing power. The bronze revolution put the traditional volunteer-warriors system into an end, and opened a way to the privately-hired standing corps, i.e., the mercenary warriors hired by a military entrepreneur called "chieftain," and a social stratum with private property and private armed force emerged from the traditional kin-based community.

4.2 The Early State vs. the Chiefdom

The early state is also distinguished from the chiefdom by two points of view. The first is a difference in how to generate the enforcing power and the second is a difference in how to acquire necessities for survival. Those differences are detailed below.

Firstly, the early state financed the cost of maintaining the armed force by collecting taxes but not by war booties gained by plunder. Those taxes are other type of spoils, which are paid by conquered people at regular periods, more or less on a contractual basis, in return for protection from capricious plunder and violent threats within and without, that is, for assuring the survival conditions of the conquered people. Such a contractual relation puts restrictions on the armed force of the early state and, in order to claim the legitimacy of the use of the enforcing power, the early kingship is required to restrict its exercise to satisfying those contracts with the conquered people. Then, the armed force is recognized to be "public," though the military system of the early state is comprised of not only drafted soldiers but also body guards who are a king's private army maintained by financing the cost at the private

expense of the king's household. In this sense, the military system of an early kingship still retains the characteristics of the military system of the chiefdom.

Secondly, the early state adopts the fourth means of acquisition—the rule—for the sake of satisfying the instinctive desires. In order to rule a territory, it is necessary to give due consideration to the economic activity and productivity of the territory. It is because it is costly to rule a territory as well as the rule is requires to satisfy the survival conditions of the ruled people, and because unless the net-benefit gained by rule were larger than the net-benefit gained by plunder, an early state could not emerge from the chiefdom, that is, because the net-benefit gained by rule is the collected taxes less the cost of governance subjected to the constraint that the rule meets the survival conditions of the ruled people. Therefore, an increase in the productivity of a conquered territory is necessary for an early state to emerge from the chiefdom. The economic productivity of a conquered territory has to increase to such a high level that it can satisfy the above benefit-cost condition by applying the bronze revolution to the production processes of the conquered territory.

Thirdly, the change of the means of acquisition from plunder into rule promotes establishing social institutions more liberated from the capricious nature of the chiefdom as well as the traditional kin-based social institutions. Such social institutions are recognized to be "formal" and called the "law." Those formal institutions are subsumed under the political system of an early state.

Apply the above "benefit and cost" condition for an early state to emerge to the determination of territory size, and then, the following analytical proposition is derived: that the territory size of an early state is limited to the border where the additional tributes or taxes obtainable from ruling a territory are balanced with the additional cost to rule it. This is the way how external relations are determined and this is why various forms of the society co-exist at the same time in human history. Such an interrelationship is subsumed under the Kantian interrelation category.

Since the early state is an accidental form of the society, it is also required to fulfill the ultimate purposes of the society in order for "person in power" to be able to claim the legitimacy to exercise the state's power. The criteria for judging the legitimacy are not consciously recognized to be definite. However, if any of those final purposes is not actualized to a satisfactory level and never tends to show any sign of recovery, the various signs of resistance demonstrated by the ruled side show that a person in power—an early king—is losing the legitimacy of the power.[31] How the ultimate purposes are actualized under the rule of an early king is shown below.

The first ultimate purpose is actualized by maintaining a military system comprised of not only armed force but also fortressed residential place.[32] Although it was maintained for the sake of the early king's self-interests, it functioned to defend the territory from external threats and to protect the members of the early state from internal threats. The second purpose is achieved by providing infrastructures and means of production for the people engaged in economic activities. The third is attained not only by establishing formal institutions but also by appealing to the religious system which sublimes various norms, codes and customs into an authorized belief and by defying, or making a myth of, the kingship of a person in power. If, in return for paying tributes or taxes, those purposes were actualized to a satisfactory level whose minimum is the survival conditions of the people, then the use of the state's power could be *de facto* legitimatized and the *de facto* legitimatization was corroborated by continuance of a political stability.

5. The Causality of the Early State

The synthetic proposition explicating why and how the early state came into being—the causality of the state—should be subsumed under the

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[31] The tyranny is a political system whose rulers lost the legitimacy of the power exercise and therefore, cannot rule by the consents of the members of a state, ending with subjugating those members by violence.

[32] See Weber (1924) as to the classical work insisting the fortressed residence is the origin of a polis type of the state

Kantian category of the causality relation, reinforced by Aristotle's way of devising causal factors. In order to derive the causality of the early state in accordance with the Kantian categorical framework, the synthetic propositions explaining why and how an early state came into being should be divided into the following five distinguishable factors: existing conditions, external shock-factors, main subjects, motives and results.[33] Since the existing conditions of the early state are the chiefdom, as a preliminary to explaining the causality of the early state we have to begin with the causality of the chiefdom.

5.1 The Causality of the Chiefdom

The existing conditions from which the chiefdom emerged are a kin-based tribe community in the last stage of the Neolithic era, in which they had been already engaging in widespread external trades. When those tribes transacted with their trading counterparts, both sides were usually accompanied with their own guardians with stone-made weapons. However, since their weapons were stone-made, the military power was balanced and therefore they chose peaceful trades on a rational basis. This is the military background of a peaceful image of external trades among the kin-based communities in the stone ages. However, if the chance is open, they took a surprise-raid option with the aim to gain war booties.[34]

The external shock-factors are the First Bronze Revolution and its applicability to both military system and production process. In the last stage of the BC 3000s it occurred and brought about a drastic innovation in weapon system and production tools such as cutting tools. The revolution was introduced to the Mesopotamia area and led it to building the urban organizations which function as the political, commercial and residential center of the chiefdom and of the early state of a polis type, later. The bronze

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[33] Such classification of the factors of the causality (α ι τ ι ο ν) originates in Aristotle's metaphysics. See Aristotle (1924).

[34] See Gat (2008).

revolution destroyed a balance of the military power among the kin-based communities. If some of them could apply the bronze revolution to their weapon system, they could have much more favorable positions in the bargaining in the external transaction the opponent counterpart of which is backed up by guardians with the conventional stone weapons. The most favorable position could be achieved by subjugating the opponent counterpart, if net-benefits gained by plunder are larger than those obtained by trade. Actually the bronze revolution increased the net-benefits gained by plunder larger than those by trade.

The motives for applying the bronze revolution to both weapon system and production process were the self-interested ones of the tribe chiefs who had already a monopolistic position in transaction with trading counterparts, or those of the military entrepreneurs many of whom had been a military officer appointed by the tribe chiefs. A drastic increase in the net-benefits of a war enterprise gave incentives for booting up their motives or drives. The First Bronze Revolution made it possible that even if the cost to maintain s bronze-weapon system was financed at their own expense, it could pay them to bear the cost and risk.

The chiefdom emerged from a kin-based tribe community as a result of the net-benefits gained by plunder growing bigger than those by trade. Such a turnaround of the net-benefits was brought about by applying the First Bronze Revolution to military system and production process.

5.2 The Causality of the Early State

The existing conditions of the early state are the chiefdom. The main concern of a chieftain is the military enterprise the aim of which is to gain war booties by plunder. If his military power was balanced with the opponent counterparts equipped with a bronze-weapons system, or if it cannot pay him to appeal to the armed force because the trading counterparts are located far away, they take the option of peaceful trade. However, in an unbalanced military-power condition in which the military-power balance tilts to some chieftain's side, he is ready to appeal to the armed force. However, as long as

the balance of military power is maintained among trading chieftains with a bronze-made weapon system, the chiefdom system continues to survive among them. In order for an early state to emerge, an innovational change has to arise between chiefdom society and kin-based communities. It is an external shock-factor taken up below.

The external shock-factor is an increase in the productivity of conquered territories, which was made possible by applying the bronze revolution to the production process of the conquered territories. Since the application of bronze-led innovations is required to provide new economic infrastructures and to dispatch managing officers, it is costly to apply the bronze revolution to the production process of conquered territories. Therefore, in order for net-revenues gained by governing a territory to exceed those gained by plunder, the economic productivity of the territory has to be raised to such a high level that the chieftains are induced to change the means of acquisition from the plunder into the rule under which the ruled people are burdened with tax payment and labor service at regular periods in return for protection from capricious plunder and from both external and internal threat. Such an increase in the economic productivity could be brought about by the applicability of the bronze innovations to the production process of conquered territories. Incidentally, this derives the following proposition: if a societal organization could surpass other ones in terms of armed force, the former could loot the latter, but the former could not yet rule the latter without the capability to apply superior technologies to the latter.

The ruling subjects of the early state are the ex-chieftains and the motives or drives of those subjects for the power to enforce are booted up by an "increase in the net-benefits" made possible by the change of the means of acquisition from the one by plunder into the one by rule.[35] The warriors and governing officers hired by an early king belong to the junior ruling class and a part of public revenues are allocated to them as the salary which has to

[35] Weber (1924) considered that an early king emerged from a charisma type of military officer. However, the image of the early king seems to be that of a chieftain and furthermore he did not explain the motives of the king for the power of a state.

exceed the ex-allocated share in war booty.

On the other hand, the people engaged in economic activities belong to the main ruled class. In order for them to concede the enforcing power used by an early king, the burden of both tax payment and labor service must be surpassed by the benefits obtainable from public services mainly comprised of both economic infrastructures and protection from external and internal threats. That is, in order to meet the condition that the ruled side concedes to bear the burden, the residual share of the ruled side in the net-benefits brought about by ruling the conquered territory is required to grow bigger than their opportunity cost which can be approximated by their ex-standard of living. This constraint condition is a necessary condition for the new person-in-power called the early king to claim the legitimacy of his exercising the state's power. In order to satisfy not only the self-interested motives of the chieftain but also the above legitimacy conditions, the "whole pie" to be shared among all members of an early state must be able to increase enough. It made possible by the application of the bronze revolution to an innovation in the production processes of the conquered territories as well as to the application to the weapon system of the early king.

As a result of a combination of the above causal factors, an early state came into being and the once-capricious plunderer changed into a regularly-exploiting early-king whose exercise of the enforcing power is conceded by the conquered people. The Sumer states were built through such spontaneous processes in the Tigris and Euphrates area and are recognized as the "original early state" in the sense that such a societal form emerged for the first time in human history in terms of the absolute ages. On the other hand, the ancient states built in the Pacific side of the South America are another example for the original early state, if the concept is formed in terms of the relative age. The historical processes of building those early states are explained in the next section.

6. Historical Examples: The Historical Correspondents of the Main Hypotheses

In this section, the evolutionary theory of the origins of the state presented in the previous sections is corroborated by applying it to the ancient societies. Since the same type of a societal form can emerge at different times in several regions separated from each other, this section begins with defining the absolute age and the relative age. Based on the definition of those terms, furthermore, the original state and the peripheral state are defined.

6.1 The Original Early State

The divisions of labor and the external trades among kin-based communities in the Neolithic ages were begun with those between agricultural tribes—more strictly speaking, irrigation agricultural tribes—and pasturage ones. Even though the former were more cost-efficient in transportation and hit-and-run attacks due to their higher movability, it was rational to maintain a peaceful way of transactions due to the high cost of looting activity under the military-power condition that both types of the tribes had to engage in the inter-tribe trades guarded by stone-made weapons in the Neolithic stone ages. The trading networks among kin-based communities spread so widely as to connect the Indus, Afghan, Black Sea, Red Sea, Anatolia region. In the last stage of the Neolithic ages, the bronze—strictly speaking, an alloy made from the mix of copper with 90 per cents and tin with 10 per cents—was developed somewhere in those regions. Since the mines of both minerals have not been discovered in the agricultural regions in the river sides of the Mesopotamia area and furthermore the modern archaeological study shows that both were imported by way of other regions such as Yemen and Oman region (later, vie Anatolia), the pasturage tribes having an advantage in transportation could learn this technological innovation, or put it to practical use, earlier or more efficiently than the agricultural tribes. It can be inferred that the military-power balance tilted to the pasturage tribes and they had an advantage over the agricultural tribes in bargaining in the transactions of the inter-tribe trades. They gradually transformed the traditional kin-based community into the more hierarchical form of the society called the “chiefdom” where the ex-elected war officers or

tribe chiefs changed in essential quality into a military entrepreneur type of war leaders called the "chieftain," and they organized the armed force at their expense with the aim of looting war booties. The enforcing power originated in this strengthened armed force, the cost of which was financed by the chieftains for the sake of their private-interests, and the armed force worked as the last resort to the power to enforce.

However, the chieftains were not yet called a "king." This is because they did not yet ruled other tribes and/or chiefdom societies conquered by them. To be a king, it required the establishment of a tax system which assures that the defeated side concedes to pay the spoils of a war from a part of their products at regular periods in return for ensuring not only protection from both plunder and any threat but also a share of their products satisfying the opportunity-cost condition. Under such a tax system the once-capricious plunderer changed the chiefdom society into a regular exploiting societal form with a contractual basis. The Sumer states were the first to build an early state through such spontaneous processes but not through the passive secondary effects of outsiders' influences on the Tigris and Euphrates area. In this sense, the Sumer states are the original early state in terms of the absolute ages.

Likewise, the processes of building the early states on the Pacific side of the South America are considered to have begun independently from the influence of any early-state building in other regions. By the familiar archaeological study of the Moche civilization which are estimated to have begun developing around the turning point of the Christian era, the contemporary relation between the metal innovation and the early-state building are corroborated. Though the metal was not necessarily the bronze but hardened copper, it was used as weapons even in the last age of the Inca Empire (the 16th century). On the other hand, the Tiwanaku civilization developed in Bolivia region around the same age developed a bronze alloy. Those traditional communities had been engaged in pasturage, agriculture, and fishing. In particular, the irrigation agriculture had been widely developed in the valley area and those communities had been networked by inter-tribe trades. Furthermore, many archaeological data show that the

political unity was formed through the process of a series of wars for conquest. Therefore, even though the processes of building the early states in those areas began much later than the Sumer ones in terms of the absolute age, the early states in those South-American regions can be subsumed under the original early state in terms of the relative ages.

6.2 The Peripheral Early State

Many political organizations in the riversides of the Nile around the BC 3000 have been considered as an original early state in terms of the absolute age, because it is a common sense to consider it to have been built around BC3000 independently from the effects of the Sumerian early-states. The Nile riversides in those days also experienced the process that pasturage tribes had moved to the Nile riversides prior to the process of early states' building, and that external-trading networks had been spreading by making use of river-water transportation as well as of inland transportations connecting with both the Red sea region and inlands. However, empirical evidences corroborating the contemporary relation between the bronze revolution and the early states' building in the Nile region are not yet found, even though the import of cooper via the Sinai Peninsula is corroborated and bronze tools were used for digging pyramid-stones in later historical stages. If the early states in the Nile's riversides were built as a result of adapting to the external impacts of the Sumer early states, they should be called a peripheral early state.

Based on the same logic, the Indus Civilization, though widely-spread inter-community trades are corroborated by Law (2011), might be subsumed under the peripheral early state, as long as the state-building in those areas are recognized as a result of adaption to the external impacts of the external trade with the Sumer states. The early states in the Yellow riversides may well be also recognized as a peripheral early state, as long as it is plausible that the bronze impacts which may belong to the second stage of the bronze revolution reached there in later historical stages around the first half of BC 1000s after overcoming a long distance-gap. The political system of a peripheral state is determined by the combination of the type of its existing

societal form with the type of the original state playing the role of external shock-factor.

On the contrary, the period in which the "Mayan early states" arose has no empirical evidence to corroborate the bronze innovation or other metal substitutes for it, though widely-spreading inter-tribe trades were corroborated by many archaeological works. The Maya has been called the "civilization of the stone-age." However, as long as those Mayan societies remained in the Neolithic age, the conventional view that the "Mayan civilization was in the stage of an early state" is in contradiction with the concept of the early state. Even if the Mayan communities were networked by inter-tribe trades and were ubiquitously engaged in wars for booties, such external relations are observed in many kin-based communities preceding the early state, as Gat (2008) emphasized.

6.3 Application to Territory Size, Federalism and Tyranny

The processes of building an early state were usually accompanied with a series of wars for conquest. However, the territory of an early state was confined to a finite size. It is because the chieftains were the rational decision-maker whose criteria for deciding on a war are the "benefit and cost" principle. If the cost to conquer a territory including the cost of governance increased to the level of benefit obtainable from it, it is rational to stop extending territory size. As the targets of conquest are located further away, the cost of conquest tends to increase. Due to such an increase in the cost of conquest, other communities and other states could co-exist independently from, and maintain trading relations with, some hegemonic states with stronger armed force.

On the other hand, the process of forming a federal state shows that all processes of a federal-state building were not necessarily associated with conquest war. This is because federal states belong to the peripheral state. That is, in order to protect its political units from some hegemonic states' threats common to them, they had to generate the sovereign power in haste and it was too risky to wait until the victor of the inner wars builds a new

integrated state.

In addition to the relative nature of the sovereign power against outsiders, the "power to enforce inside members" was also relative in the sense that its actual level depends on how much sufficiently the conditions of legitimacy are satisfied. An unbearable burden may be imposed on the ruled people due to an increase in the cost of not only maintaining main economic infrastructure but also mobilizing qualified members into a war. Then, the state's power becomes less tolerable to both inner resistance and outside threats. As the consents of the ruled people tend to be lost, a person in power is destined to appeal to a straight violence in order to keep political system under his rule. The tyranny is a political system in the last stage of such a political process through which the once-legitimate state declines to a ruin.

Concluding Remarks

In this chapter, the theory of the state is reconstructed by taking into consideration recent historical, archaeological and biological study indispensable for understanding the essence of the state under the Kantian categorical frameworks. The main propositions were derived from generalizing the synthetic propositions of the early state and are summarized as three synthetic propositions. I called those propositions on the state *en masse* the "evolutionary theory" in the epigenetic sense.

Furthermore, it is shown later that the evolutionary theory is applicable to various types of the state appearing in human history later than the early state. It is needless to say that it remains to supplement relevant historical details in order to establish the evolutionary theory as the general one.

Taking up some problems which require for immediate solutions now, it is an urgent work to apply the main synthetic propositions to the problem of state-building in conflict-torn countries and to the present international relations, *mutatis mutandis*. The state is not a fixed precondition for economic or political analysis. If the political system of a state cannot reconcile the selfish motives for the state's power with the achievement of the ultimate purposes of the society, in other word, if it cannot satisfy the legitimacy

conditions, the capability of the state to achieve the final purposes of the society declines. It is because the economic power which financially supports the origins of the power is weaken by sticking to contradictory or irrational policies. Then, the actual level of the state's power also declines, leading to a decline in the economic status, the diplomatic influence and the military power. In such circumstances the state is more exposed to threats both from outside and from inside. Many of the once-thriving states ruined in such a process in the end.

At this final stage, it may be in order to mention on the" evolutionary" approach to which the text of this paper has not explicitly referred, though it is not required to have the thorough knowledge of its details as the preliminary condition for readers to follow the logic of this paper. The term "evolution" is used in two meanings as follows, below.

Firstly, the evolutionary approach is the view point derived from the modern biology and neuroscience, according to which human behaviors are put in the perspective of the genes mechanisms. The traditional approach of both economics and political science, based on the individualism, is inclined to focus only on the human behaviors driven by the instinct programs but controlled by the cognitive functions of the cerebrum, implicitly subject to the homeostatic limits. On the other hand, other types of human behaviors beyond the framework of that traditional approach had to be explained in terms of artificial concepts such as the social capital and the behaviorism until now. Such a disorder in the traditional approaches originates firstly in ignoring the other programs of the selfish genes, in particular, the emotional programs, and secondly in confusing the egoism of an "organic individual as the agent" with the selfishness of the "genes as the principal." Human behaviors in both economic and political arenas are required to be put in the perspective of the whole programs of the genes and to be reexamined from those points of view.

Secondly, the "evolutionary theory" is based on the "epigenetic hypotheses" of the genes mechanisms, and the "emergence concepts" rather than the Darwinian ones. It is because the former seems more plausible in emphasizing the fundamental fact that when faced with new circumstances,

Homo sapiens have been trying many innovative enterprises to adapt to them regardless of evolving to mutant genes or not, whilst the Darwinian approach recognizes any mutant as an accidental change.

Chapter 2
Generalization and Applications to Other Types of the States

In the first section the synthetic propositions on the early state are generalized into three general synthetic propositions on the state. They comprise the fundamental part of the evolutionary theory of the state. In the second section, in order to corroborate them, it is shown that they are applicable to other types of the states appearing on the history later than the early state.

1. The General Synthetic Propositions on the State: Toward the Evolutionary Theory of the State

In this section the synthetic propositions on the early state derived in the first chapter are generalized to the evolutionary theory of the state by abstracting the essential factors of those propositions. The generalized propositions are classified into the concept part and the causality one. In this section they are explained, in turn.

1.1 Generalization to the Concept of the State: the Evolutionary Concept of the State

In this subsection, two general propositions on the evolutionary concept of the state are derived from the synthetic propositions on the concept of the early state. The first is derived by distinguishing how the enforcing power is generated and the second is by explicating why one type of the state came into being.

The First Proposition based on Differences in How to Generate the Enforcing Power

Any historical form of the state appearing after the early state has to be distinguished not only from the preceding state's form but also from the

succeeding one. The first distinction is made by a difference in the origin of the enforcing power, that is, by a difference in "who finance the cost of the armed force as the last resort in anarchy" and by a difference in "who or what types of political-military entrepreneur organize financial supporters, military personnel and bureaucrats into the enforcing power." As a result, each type of the state is determined by how the enforcing power is generated.

In order to generate the power of a state in the end, it is necessary for some type of political-military entrepreneur to organize both human resources and economic ones into the armed force as the last resort in anarchic situation. [36] Whilst those human resources must be qualified for operating the state-of-the-art military technology and for managing bureaucratic organizations, the economic resources have to be able to finance at least the cost to maintain the armed force comprised of the military and bureaucratic personnel and weapons in anarchy. The "military power" is relatively determined by how the political-military entrepreneur can effectively combine those human and economic resources into the power to enforce for a war for defense, and lead them to the power of a state in the end.

In order for some economic classes to bear the burden of the economic cost of generating the power, it has to pay them to take on two kinds of the cost burden. The first is the cost to finance the armed force in anarchic situations as a prior investment and the second is the cost of paying taxes financing the government under an established state. Those economic classes are motivated to bear those costs, only if economic policies carried out by the government established under the state contribute to increasing the net-benefits of those economic classes. More strictly speaking, in order for those economic classes to be the main provider of the public fund to financially support the state's power in sufficiently long periods, their business has to represent the main leading sectors of the historical stage in the sense that the more contributive to their business the economic policies are, the more tax revenues the government can gain by way of an increase in the export, investment and economic growth.

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[36] If the anarchic situation takes the form of elections under democracy, the armed force is replaced with the so-called "election machine."

That is, the economic activities of those economic classes must represent the innovative technologies of the age.

On the other hand, as well as the political-military entrepreneur has to be able to mobilize financial supporters, military and bureaucratic personnel into the armed force in anarchic situations, he also has to organize military staffs qualified for the operation of the military technology and bureaucrats qualified for the management of the government into the state's power by using the fund which is provided not only by those economic classes but also by the ruled people in return for providing public services. Since the military technology is influenced by those technologies innovated in the economic sector, the military technology is also represented by the innovative technologies of the age. However, if the age is in a revolutionary stage, a qualified type of political-military entrepreneur is of a hero type and therefore, all societies are not necessarily provided with such a political-military entrepreneur in spite of the popular saying—"The age brings about the hero." Those main factors are summarized by the first general proposition below.

The First Proposition of the Evolutionary Theory of the State

The form of a state is determined by whom and by what mechanism the core or avant-garde social organ functioning as the armed force in anarchy—the last resort to the enforcing power in anarchy—is generated. If the "anarchy" corresponds to the social circumstance in which an election campaign to determine new ruler is in progress, the "armed force" means the election machine which financially support political entrepreneurs standing as a candidate for election. Innovative technologies, economic classes with the capability of financing the cost of the armed force, military technology and a type of political-military entrepreneur are main factors to distinguish the form of a state from the preceding and succeeding form of the state.

The ruling classes of a state are comprised not only the principal members who can generate the enforcing power but also of the agent members entrusted to use the power by the principal. The enforcing power generated by the ruling classes allows them to pursue the maximization of their self-interests, subjected to the survival conditions of other members. On the

other hand, the ruled classes are those members who, though excluded from the use of the enforcing power, can determine whether they should concede the state's power exercised by the ruling classes, i.e., whether the state's power is legitimate or not.

The Second Proposition based on Differences in How to Satisfy the Ultimate Purposes of the Society

As long as any form of the state is also one form of the state, it has to fulfill the final purposes of the society itself by exercising the enforcing power. The First Proposition insists that "who generate the enforcing power" is a factor crucial for determining the essential characteristics of any type of the state. On the other hand, "how the ultimate purposes of the society are fulfilled by the exercise of the enforcing power" is dependent on political system, since those purposes are actualized by way of various policy measures carried out by the governing agents to whom the exercise of the enforcing power is entrusted by the "persons in power" as a principal who generated the power to enforce, or in whom the sovereign power originates. However, even if how to actualize the ultimate purposes of the society is various depending on political system, they must be fulfilled in order for the exercisers of the enforcing power to be able to claim the legitimacy. The main points to be checked for judging the legitimacy are as follows: The first is whether the enforcing power is used for satisfying the targeted goal of protection from threats from within and without. The second is whether the instinctive desires are satisfied on such a high level as to exceed survival conditions. The third is what kinds of whether social institutions are working effectively for maintaining the legitimate political system. The power of the state has been *de facto* legitimated, if it can actualizes those purposes on a satisfactory level.

As said in First Proposition, the first ultimate purpose is actualized by the armed force as the last resort. It manifests its concrete form in the military power which is generated by combining the following factor-subjects: the political-military entrepreneur, the economic power financing the cost of a military system—comprised of not only the main economic classes working as

a financial supporter since the process of a state-building but also the tax-payers who concede the state's power — and the military personnel qualified for a "state-of-the-art" military technology in the age. Although the political-military entrepreneur is self-interestedly motivated to take the initiative in maintaining the military power—for example, he is driven to organize the military power with the aim to monopolize tributes or taxes, motives for self-interests tend to impel him to provide both defense against external threats and protection from internal illegality, as a result.

The second purpose is actualized by pursuing an economic policy promoting the leading economic sectors with the state-of-art technology to grow. More concretely speaking, it is achieved by carrying out such an economic policy as to increase the net-profits of the economic classes and the net-revenues of other tax-payable classes, both of whom share the burden of the cost of a military system, subjected to the constraint that the survival conditions of the ruled people are met. Since, if such an economic policy is successful, the economic resources to support the power and his private revenues can increase, the selfish motives pf the political entrepreneur tend to promote him to adopt such an economic policy, as long as he claims the legitimacy of the power. On the other hand, as long as their instinctive desires are satisfied by way of the economic policy, the leading economic classes and the ruled people concede that the political-military entrepreneur continues to exercise the state's power and then, the power of the state is *de facto* legitimatized.[37]

The achievement of the third purpose is promoted by establishing an

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[37] When the economy stagnates by discordance among economic policies, it becomes hard to reconcile the goals of the leading economic classes with those of the other ruled people. One of the ancient examples is as observed in the external trade policy of ancient Athens which pursued the export of processed agricultural products such as wine and olive oil in return for the import of cones. Whilst the former are the main products of the aristocrats who served as the warrior of cavalry, the latter are those of the independent farmers who played the core role of the iron-armed heavy infantry system. An economic downfall of the independent farmers resulted in the ancient empire state in Athens and Roma, in the end.

imaginary community[38] which is formed by uniformalizing various cultural factors, such as religions, languages, histories, myths, norms, customs, ethical codes, legal systems and ethnical grouping, into a set of cultural packages. Such integration into a single cultural unit strengthens the military power, the political-military entrepreneur is self-interestedly motivated to seek such an integration policy.

To sum up, the political entrepreneur is self-interestedly motivated to satisfy the ultimate purposes of the society, as long as he claims the legitimacy of the state's power. The above propositions are summarized as the Second Synthetic Proposition on the evolutionary concept of the state, as follows below.

The Second Proposition of the Evolutionary Theory of the State

Though the political system of a state is determined by how the ultimate purposes of the society itself are actualized by the use of the state's power, the self-interested motives of a political-military entrepreneur tends to impel him to achieve the three ultimate purposes of the society, as long as he claims the legitimacy of the state's power. If the self-interest seeking use of the state's power can be reconciled with actualizing the ultimate purposes of the society on such a satisfactory level, the political-military entrepreneur is *de facto* conceded the legitimacy of the state's power by the members of the state.

1.2 Generalization to the Causality of the State

The propositions explaining why and how an early state came into being—the causality of the early state—was composed of the following five factors: the first one is the existing conditions (for instance, the existing condition of an early state is the chiefdom society). The second is the external shock-factors (for example, the external shock factor of the chiefdom is the First Bronze Revolution). The third is the main subjects (for instance, those of an early state are a chieftain-turned early king, hired warriors, and working

[38] See Anderson (1983) as to the concept of the imagined community.

classes engaged in the main economic sectors). The forth is their motives (for instance, those chieftains are a self-interested subject). The fifth is the final result—the emergence of an early state. These five factors are generalized in a straight way to various types of the state appearing after the early state. They are summed up as the third general proposition, below.

The Third Proposition of the Evolutionary Theory of the State

The existing conditions of a new type of the state are the existing state just preceding the new one. The external shock-factors are an innovative technology such innovative that if it is applied to military system as well as to production process, it becomes rational to change the means of acquisition from peaceful trade into rule. A part of venturous members in the existing states are self-interestedly motivated to take the initiative in adapting to those external shock-factors. They are comprised of a ruling political-military class and a ruling economic class mentioned in the following. The main subjects are comprised of the following: The first is the ruling political-military classes who are comprised of a political-military entrepreneur and the military and managing personnel to whom part of the use of the power is left. The second is the ruling economic classes with an economic power who are usually engaged in leading economic sectors with the state-of-art technologies in the age and whose economic power makes it possible for them to finance the cost to maintain the armed force both in anarchic situations prior to the establishment of a new state and after the state-building. The third is the ruled people engaging in the process of direct production and trade, who agree to pay taxes and concede the enforcing power used by the ruling class in return for the assurance of their survival conditions. The motives of those subjects for participating in the state building are the self-interested one. The result is that the new type of the state emerges and that as long as the ultimate purposes of the society are actualized on a satisfactory level, the power of the new state is conceded the legitimacy. The tyranny is the political situation in which the state's power has lost the legitimacy due to a failure to achieve the ultimate purposes and to no sign of recovery from it.

2. Applicability to Other Forms of the State

In this section, it is shown that other forms of the state appearing on the historical stages after the early state are categorized in accordance with the above three general propositions abstracted from the synthetic propositions on the early state.

2.1 The Ancient Aristocracy in the Second Stage of the Bronze Revolution

The existing condition of the ancient aristocracy is an early state. The external shock-factor of the ancient aristocracy is the Second Bronze Revolution which brought about an innovation in both military system and economic system. The military system is characterized with a horse-pulling war coach driven by an armored warrior and driving valets. On the other hand, the economic system is characterized with autarkic economy the ownership of which belongs to aristocrat-warrior. He manages it to maintain the military system at his cost.

The economic background of this system is that the ancient kingship of the early state could not finance all of the cost to maintain a new military system adopting the second bronze-innovations. It is because it was too costly for an early king by himself to maintain the new military system. Those horse-pulling war coaches had wheels cum-spokes. They were introduced to the Near East region around BC 1800 by the Hittites, after the more primitive coaches with spokes pulled by small-scaled Equidae named "onager" were developed around BC 3000 in Mesopotamia and the horse-pulling coaches with wheels cum-spokes were developed in the Step area of Eurosia around BC 2000. Then, they were spread to other regions such as Egypt by the Hyksos, India by the Aryan, and Greek by the Mycenaean. In the end, around BC 1200 it was introduced to the northwestern part of China by the ancestors of Zhou dynasty.

The new weapon system in the second stage of the bronze revolution was a distinguishable change from a club weapon with bronze head characterizing

the first stage of the Bronze Revolution, and the new weapon system overwhelmed the old one in battles between the aristocrats' corps and the traditional foot soldiers with those conventional weapons. One unit of corps is composed of one warrior dressed in bronze-made armor and some attending valets taking on the role of a coach driver and assistant. Those bronze-armored warriors are called the "ancient aristocrat." They took on the cost to finance such a new weapon system at their expenses, because it could pay him to take on the cost on a rational basis. That is, since the benefits of joining in a war enterprise exceeded the cost to provide for the armed force, those aristocrat-warriors were motivated to bear the cost of the armed force on their own. As a result, the power to enforce changed to originating mainly in the armed force of the aristocrat warriors. They ruled their own economic bases called the *oikos* or *oikoi* in the ancient Greek. The war leader of a military entrepreneur type organizing those aristocrats into an army team is considered to be *primus inter pares*—the chief among the equals— though he has been often called a "king."[39]

Since the power of the state is supported by the armed force as the last resort and aristocrats share in the cost of the armed force, they can also share the power of the state in proportion to the armed force they provide for an aristocratic state.

Finally, in order to fulfill the ultimate purposes of the society, the aristocratic rulers also had to meet the survival conditions of the ruled members—the members of their oikos. The exercise of the enforcing power could be conceded by the ruled members, only if those conditions were met. A

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[39] Documented data to robust have not been found except for archaeological evidences. Popular scenes described by Homer may be considered to represent the aristocracy state but actually they correspond to the chiefdom, though the weapon system represents the second stage of the bronze revolution. This discordance is due to the peripheral nature of the Mycenaean states, in the sense that a societal form in the chiefdom age had to adapt to the impacts of the societal form in the age of the second bronze revolution. By contrast, the images of the Chou dynasty are more robustly confirmed by historical documents.

part of the products in oikos are supplied to markets for exchange. The more powerful the armed force is, the more affluent the oikos economic basis is, and vice versa. Such an ascending spiral is a phenomenon characterizing the developing process of the ancient aristocracy.

2.2 Timocracy and Ancient Empire in the First Stage of the Iron Ages

Around BC 1200, the aristocratic states in the second stage of the bronze ages, such as the Hittites and the Mycenae, were ruined all together as a result of the invasion by the so-called "sea tribes" equipped with iron weapons. Their native lands are considered as Anatolia and the Aegean Sea. The basic corps of its military system was comprised of horse-riding warriors and heavy infantry but the main armed forth in battles was the heavy infantry.[40] For example, in the last stage of the dark ages in the ancient Greek, that is, around BC 900 to BC 800 in which the aristocratic states had been destroyed by the iron-armed tribes, the traditional rulers of the Greek were still the bronze-armed aristocrats with their own *oikos*. Though they were a horse-riding warrior armed with the bronze weapons, they had not yet organized their corps into a team comprised of a mix of horse-riding warrior and infantry equipped with iron weapons. The iron revolution in the first stage brought about such an innovation in the military system, which is characterized with a team of horse-riding warriors and infantry. Furthermore, it also brought about a technological innovation in farming tools, and then, the iron revolution became the external impact-factors of the timocracy usually called the "ancient republic."

Prior to the spreading of iron-made tools around BC 1000, which was promoted by a drastic cut in the cost of producing those iron tools, the horse-riding technology began developing since BC 2000 near the Caspian Sea and the Aral Sea, and was developed, in particular, in the Karasuk age (BC 1500 to 800) which was still in the second stage of the Bronze

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[40] It is inferred from the relief describing wars in the ancient Egypt. See Gat (2008), chap.11.

Revolution.[41] It became possible by breeding a large-scaled type of horses with the withers height of 140 to 150 cm. Pasturage tribes adopting the horse-riding innovation could move their economic base to the wider steppes far away from agricultural areas and developed themselves to the so-called "horse-riding nomads" and began invading agricultural societies. The Scythians and Kimmerians are an example for those horse-riding nomads.

On the other hand, the introduction of iron tools to farming work and the self-arming of self-employed farmers were spread after it became possible to cut the cost of iron-made tools around BC 1000. It is around BC 900 that Assyrians—*the first state of an empire type based on the lands* —adopted both the horse-riding innovation and the iron innovation together. A little later, the Achaemenian Persians could introduce both of those innovations, too. In Greek around BC 700, iron-made tools were considered to have been already spread to the self-employed farmers, according to the popular work of Hesiod. The self-employed farmers could equip themselves with iron-made weapons for infantry service at their own expenses. They grew to one of the main economic classes in which the power to enforce originate. In the end, they gained the rights to participate in political decision-making, subject to the constraint firstly that the rights are proportional to the property they hold and therefore to the burden of military cost, and secondly that commanders in chief and administrative officers are elected from the horse-riding aristocratic class. This form of the state is called the "timocracy" in the ancient Greek, which Aristotle admired as an ideal political system. Those innovations in the horse-riding and the iron-made tools were the external impact-factors of not only the timocracy but also the ancient empire appearing later, in the sense that the "power to enforce" in both types of the ancient states originated in the military system comprised of a set of horse-riding warriors and iron-armed infantry, though the armed force of the ancient Athens empire was further strengthened by the navy corps whose main members are mobilized from the demos serving as a hired sailor.

No-property classes such as the people engaged in commerce and

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[41] See Hayashi (2009).

handicraft and the ruined independent-farmers were freed from the obligation to maintain the armed force on their own. They have only the obligation to join in a war declared by the name of a polis. In return for that obligation, they have the proportional political rights to give sanction to the election of the consul recommended by the senate and the rights to be freed from direct taxes. Those no-property classes consist of the ruled people of the timocracy. The legitimacy condition is satisfied, if the net-benefits of the ruling classes are maximized subjected to the constraint that it meets the survival conditions of the ruled people and of the independent farmers. The "bread and circus" policy was aimed at working as one of the means to satisfy those conditions. The timocracy reined by losing the legitimacy in the end, since those independent farmers were deprived of their economic basis - wheat farming - by the main external trade policy of the ancient republic system, which is designed so as to promote the export of processed and finished agricultural products such as wine and olive oil in return for the import of wheats.

Here, it seems worth paying attention to the reason why the first stage of the iron revolution brought about two distinguishable forms of the ancient states—the timocratic type and the centralized empire type. The reason lies in a difference in the main battlefield where they had to fight with their main enemies. The main battle fields of Assyrians were the wide plain areas where the movability of horse-riding warriors could play a more crucial role in winning than if the battlefield is in narrow areas. On the other hand, the main battlefield of Greek is surrounded by mountains and swamps. Thus, the iron-armed infantry of the Assyrian army could not play the main role but played an assistant role in the battle in those plains—such as a role to guard other warriors taking on the attack by a bow and arrow. By contrast, in the narrow battlefields in Greek, the horse-riding corps could not make available of their high movability. In the crucial stage of many battles, they had to get off from a horse for fighting together with the infantry armed with iron-made weapons. On the other hand, these infantry corps played a crucial role. This means that the Greek self-employed farmers consisting of the infantry corps contributed to strengthening the armed enforce more and the state's power

than those of the Assyrian army. It is because this difference in the contribution to the power origins was crucial why the first stage of the iron revolution brought about those two different types of the state. In this respect, the Achaemenian Persia also shared the same characteristics with the Assyrians.[42]

As well known, however, the ancient Attens also changed into an empire-state in the end. As said in the above, this is because the economic base of the self-employed farmers had been ruined under the Athenian rule under which the external trade policy promoted not only the export of the processed and finished goods such as wine and olive oil but also the import of the lower-priced wheat from the Black Sea regions. However, the wheat is not only one of the necessary goods desired by the Greek consumers but the main product of the self-employed farmers on the Greek side. The wheat production in Greek was costlier because the croplands are in narrow areas surrounded by mountains. In the end, the self-employed famers lost their economic base which financially contributed to maintaining the infantry system with the iron arms, whilst both the aristocrats who engaged in the production of wine and olive and the marine traders who took on risky marine business could accumulate their private wealth. In order to maintain the traditional trade-policy, the navy corps had to replace the infantry in the end. The seamen played an important role in the navy and were mobilized from craftsmen and other non-property classes. However, they could not provide themselves with armaments on their own and therefore had to be employed as the public official, whose salary was financed with the war booties and tributes from the allied subordinate polis. In this process, the necessary goods desired by Athens continued to increase not only in kind but in volume, because the materials and natural resources necessary to strengthen the navy power, such as timber and iron, added to those conventional ones represented with wheat. This pressed the Athens to enlarge supply-roots for those goods and maintain them in a stable condition. Therefore, they were

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[42] The first empire type in China—the Qin and Han—was also faced with plain battlefields. This is why those dynasties are of a centralized nature.

motivated to purse a monopolistic bargaining-status in the transaction of foreign trades. In the end, Pericles ushered those ancient mass-democrats into the *de facto* ancient empire-state. Such a historical process is observable also in the process of building the ancient Roman-empire, if the navy is replaced with mercenary soldiers employed by candidates for the emperor.

As well known, it is by Alexander the Great (BC356-323) that the ancient empire state was consummated in the Hellenes world. He is the military-entrepreneur who could put into practical use all military innovations in the ancient age—heavy infantry, horse-riding warrior and sieging operation system, all developed by his father.

2.3 The Medieval Feudal State in the Second Stage of the Iron Ages

The existing condition of the medieval feudal state is the last stage of the ancient empire-state's age. The ancient empire-states in the golden days had peaceful external-trading networks with neighboring pasturage tribes—for example, the ancient Roam vs the Germanic tribes, and Han dynasty vs the pasturage tribes in the west-north regions, though in the beginning period the Han dynasty was subordinated to the more military-powerful horse-riding nomads called the Xiongnu. Those pasturage tribes gradually made inroads into the anarchic regions where the military balance was tilted toward the pasturage side. They occupied the ruling position, ruined and took over the empire in the end. In the process of building an ancient empire-state, it required such a cultural system as to promote the members of an empire-state to feel a sense of unity and to have common criteria for communication. This is because not only the conquering members but conquered members, both of whom were incorporated into an enlarged political unit, had been once in various traditional cultures. A universal religious system played the role of consolidating those multiple cultural factors and replaced the traditional animism and ancestor worship distinguishing one member society from others. Under such existing conditions with common cultural systems, the second stage of the iron revolution arose in the following regions: the northwestern part of Europe, the

territory of the Byzantine Empire, the Egypt under the Mamaeluke and Japan.

The iron age at the second stage is the external shock-factor and it brought about new technological innovations in agriculture—to take an example from the northwest of Europe, the deep plowing by horse-pulling and the three-field system.[43] Those innovations made it possible to extend arable land to the once-barren areas filled with forest, solid soil and marshy land. Farmers could engage in farming in those areas, if they were organized into one production unit which required the above-mentioned innovative tools and domestic animals under a new production system embodying those technological and organizational innovations. Since it was too costly for a few farming workers to put those innovations to practice at their expense, a new type of agricultural community had to be organized and to function as the basic unit of agricultural venture. Those circumstances *en masse* were the external impact-factor of the feudal state in the second stage of the iron revolution.

The main subjects are, at first, local bosses, monks, and aristocrats' descents under the ancient political system, who took entrepreneurial leadership for new agricultural ventures mentioned above. After Karl Martel introduced the "comes" system in the 8th century, a new type of agricultural entrepreneurs called "comes" was dispatched to the confiscated Catholic monastery lands as the warlord ruler. Those agricultural entrepreneurs had to manage their manors to finance not only the investment in agricultural ventures but also the cost to maintain a horse-riding warrior system clad in heavy armor with a bow and arrow at first and with iron spears accompanied with stirupps later. (In the case of Frank, stirrups prevailed after the 8th century and saddles and spears after the 12th century). The horse-riding

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[43] Strictly speaking, these images of a farming community are a typical one in the final stage of the medieval feudal period after the later stage of the Carolingian dynasty. Until the later stage of that dynasty, it is not corroborated that those iron plows were used in that territory. Archaeological study shows only that in the homeland regions the three-field system and the so-called "classic manor system" were prevailing. See Horikoshi (2010).

warrior system was superior to the conventional ones in a power to strike by taking advantage of saddles, horse's hoof, and stirrups. Since the political authority under the ancient empire system could not maintain the economic base to finance the cost of the new military system to rule effectively over those new cultivated lands, it was inevitable for those lands to become a private estate called the "manor." The manor system was promoted and established by the mutual contracts between the manor war-lords and the one with hegemonic power among them called "regional king." According to those mutual contracts, the former are assured of the rights to their manors in return for taking on the cost to maintain heavy-armored horse-riding warrior corps and joining in wars led by the regional king. Based on such contract, the manor warrior-lords gained the status of a feudal aristocrat.

The manor was managed as an autarkic economic community where the farming workers called "tenant" paid tributes and corvee of a various type in return for the benefits of infrastructures for agricultural production and consumption. (The corvee was replaced with a fixed amount or a fixed rate of tribute, later). Furthermore, the manor lords provided peddling salesmen and craftsmen with market places in the territory and gained revenues form taxes on them. On the other hand, at first the effectiveness of the property right to those lands was not secure, as long as it had to be assured by the manor lords' own military forth. They enhanced the effectiveness of the ownership right by allying with more powerful lord or the traditional authorities including religious ones. As said above, the ownership of a manor warrior-lord was guaranteed by mutual contracts with the more powerful agents such as the regional king or the traditional religious authorities gaining a pseudo-form of donated lands. The regional kings had been hostile to the traditional authorities for clash of interest, until the former overwhelmed the latter in the military power and established the absolute monarchy in the end.

To sum up: The main ruling subjects of the mediaeval feudal state[44] are the

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[44] Bull (1995) denies, based on the relativity of the sovereign power, that the medieval regional power is a state. He denies it, because neither the regional kings nor the warlords had the absolute power over their territories and the

manor war-lords and the chief among them called a regional king. The power to enforce originates in the military forth provided by their alliance or mutual contracts. Net-benefits gained by managing and protecting a territory manor motivated those ruling subjects to bear the cost to maintain the military system equipped with an innovative horse-riding technology. They may be called a "regional state," [45] since the territory of one regional state was located inside a much wider area of the ex-ancient empire state and continued to fight with each other to enlarge their territories and trade networks. However, the power to enforce is relative but should not be considered as the fixed one imaged by the term the "sovereign" or "absolute" power. The state's power of the regional state is relative to the state's power of the absolute monarchy. On the other hand, the main ruled people of the feudal state are the farming workers of a manor, merchants, and handicraftsmen. The rulers had to satisfy the survival conditions of those ruled people in order to claim the legitimacy of using the enforcing power. The necessary conditions required that the burden of various types of tax and corvee had to be surpassed by or at least was equal to the benefits obtainable from the economic infrastructures

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independence power against the Pontiff and the Holy Roman Emperor. His denial is based on the fixed image of the state's power, according to which the power must be absolute in the sense that violence is monopolized inside the territory and that it is strong enough as to protect the state' members and territory from any external threat.

[45] The Byzantine Empire was actually a regional kingship adopting the mediaeval feudal hierarchical relations based on mutual contracts on how to finance the armed force comprised of horse-riding warriors, infantry and navy soldiers. The difference from the feudal state of the west Europe lies in that the Byzantine emperor had his own armed force overwhelming local warrior lords under the military system called "Themata" and that the armed force under the direct control of the emperor was financed with an entire-territory scaled taxation system comprised of taxes on independent famers and commerce. Thanks to such adaptation to the feudal military system, the Byzantine could maintain life against military threats from the neighbor nomadic states much longer than the West Roman empire. The Tang dynasty in China also shares the similar characteristics with the Byzantine Empire.

and protection from any threat. As long as the manor war-lords want to claim the legitimacy, their self-interests motivated themselves to do their best to achieve the targeted goals of the survival conditions, because without achieving those goals, the military power is weakened.

2.4 The State of Horse-riding Nomad, Sea Nomad and Camel-riding Nomad: The Outside World of the Medieval Feudal States

The horse-riding nomads in the steppe areas, the sea-river traders with an armed transportation system in the northeast Europa, and the desert merchants with an armed caravan system were one of the outside social conditions with which the medieval feudal world was faced. Though those outside groups had been trading with the medieval world, their military predominance continued to be a serious threat to the medieval feudal world. The military power of those outside trader-groups was generated by combining their superior transportation system with high movability, economic wealth and an iron-armed soldier system. It is after Carl Martel adopted the horse-riding warrior system of al-'Abbasiya dynasty that the Caroling could occupy a dominant position in the Frank world. In this subsection, those three types of a nomadic state are examined according to the main propositions on the evolutionary state, in turn.

The Horse-Riding Nomadic States

The horse-riding was developed in the Eurasian step area around the 1300BC of the Karasuk culture age which was still in the second stage of the Bronze Revolution. As a preliminary, it required for an innovation in the breeding of large-sized horse, which is considered arose around the late 2000BC near the Caspian Sea and the Lake Aral. Kimmerian and Scythaen are the first to emerge as the horse-riding nomadic state in the history. They could stand at advantage over agricultural societies by their military power. It was made possible not only by their superiority in the movability but also in the flexibility of war tactics such as the less costly "hit and run" tactics made possible by the movability of their economic base—pasturage.

The nomadic pasturage also requires for both agricultural products and metal products to maintain their economic life. As long as their military power cannot surpass that of other societies which produce those necessary goods, the nomads go along with a peaceful trade with those supplier-sides. When the balance of the military power changed in a way favorable to the nomads, they changed the peaceful means of acquisition to the one by plunder. The Turk, the Xiongnu, and then the Hun established the "rule and ruled" relation with subjugated agricultural states where the ruled side conceded to pay various tributes to the ruling side at regular periods in return for the assurance of stopping violent plunder.

However, as long as the economic base of those horse-riding nomadic states continues to be nomadic pasturage, they could not govern the subjugated states in such a direct way as to move their economic base to the subjugated territories. The Hungary step was so long the western border where early horse-riding nomads can station.[46] This is why those early horse-riding nomads had to be satisfied only with extorting the subjugated side to pay tributes from outside. After it became less risky to move from the nomadic home lands to the capitals locating in the subjugated agricultural areas and sufficiently large wealth gained by taxing on commerce added to the nomadic pasturage, Mongolians and Turks built their capitals in the agricultural center.

The Muslim Arab State

The Muslim Arab state is distinguished from the above horse-riding nomadic states by three characteristics. The first one is that the economic base of the Muslim Arab is the "commercial business equipped with an armed forth" which networked scattered communities in the desert areas, and the second is that they formed, in a dominant position, an alliance with the Bedouin camel-riding nomads with the aim of making up for the transportation capacity and supplementing the military power. The third is that the power to enforce originated in the military power generated by

[46] See Gat (2008).

military entrepreneurs with talents for organizing cooperative followers into one commerce-alliance whose solidarity was further strengthened by religious appeal as well as by economic incentives. In the year 622 Muhammad organized a religious community called "umma islamiya" into a societal form of a chiefdom type in Medina, and then he started engaging in a "commerce cum plunder" venture after such a communal organization had been arranged somehow. He became a king around the year 628 when the armed force of the umma community conquered an oasis city in the northern neighbor and introduced a tribute-paying system replacing the traditional means of plunder.

The Sea Nomad

Some parts of the sea nomads moved into the mediaeval world and occupied a dominant position. Other parts settled in their home land areas and built a new type of state called the "Viking state" which financed the cost to maintain the armed force by tariffing the marine business passing its territory. The enforcing power originated in the armed force whose cost was financed by combining a superior water- transportation system with a "commerce cum plunder" enterprise. By appeal to such an armed force, the ruling Viking looted at first and in the end, conquered to rule agricultural societies.

The above two types of a land nomad-state were taken over and consolidated by the Mongol Empire which could take advantage of both nomadic movability and gunpowder for the sake of military innovations. The cost of the military system was financed by taxing on commerce sector and agricultural one. Though the process of a war for conquest stopped at the Hungary plane as other nomadic conquerors did, both gunpowder and primitive firearms which the Mongol Empire brought to Europe changed the military balance among the mediaeval feudal states in rival and played the role of an external shock-factor to the next historical age—the absolute monarchy.

2.5 The Absolute Monarchy in the Discovery Age with the Firearm Revolution

In the last stage of the mediaeval feudal ages, in particular, after the 14th century, the traditional manor system of an autarkic type was taken over by a market-oriented agricultural system under which the once feudal tenants grew to a self-dependent farmer or a large-scaled agricultural entrepreneur tenanting the former landowners' lands. The market system extended nationwide and the worldwide oversea-business was just around the corner. The inner wars among the regional kings and/or the warlords continued with the aim of monopolizing levies on those newly-arising market businesses. Under such existing conditions, the firearm revolution became an external shock-factor and changed the balance of the military power among the regional kings. A series of inner wars among those regional kings in the last stage of the middle ages ushered in the age of the absolute monarchy.

The victor of the inner wars was such a regional king as to be able to take the lead in adopting a new military system equipped with firearms. In addition to the lethal superiority of the firearms, the new military system could maintain the full-time standing army which can join in a war in any time under the direct conduct of the regional king. In order to take the lead, however, a new source of funds to finance the cost of the new military system had to be found out, since the feudal military system was maintained under the feudal tributes system. The new source was found out in a new economic power generated by then-arising new economic classes engaged in oversea business, domestic commerce, market-oriented handicraftsmen and market-oriented farmers. [47] In particular, the oversea businessmen represented a new ruling economic class. The regional king equipped with the new military system could overwhelm his rivals both by the military power and by the economic power. It was an inevitable result, as long as his rivals

[47] Those economic classes supporting financially the new armed force system are not only engaged in market-oriented businesses but also city residents. In this sense, the absolute monarchy is combined with commercial towns from the beginning.

remained dependent on the feudal military corps which is comprised of semi-independent feudal war lords.[48] A drastic increase in the net-benefits gained by a war enterprise—a war for territory—motivated the regional kings to introduce the new military system at their own cost, which was financed by the tax-revenues paid by those economic new classes. The final victor of the territory wars among the regional kings became the absolute monarch. Though the ex-regional kings and the feudal war-lords were downgraded to the aristocratic bureau status, they also consisted of the ruling group. The power of the state originated in the combination of a political-military entrepreneurship of the absolute monarch with the economic power of those new economic classes. The ruled classes are those people engaged in small domestic business and farming work. As long as the benefits obtainable from the provision of economic infrastructures and the protection of life and property are larger than the cost to bear the burden of tax and corvee, they could concede the state's power used by the absolute monarch and then, the power became *de facto* legitimate.[49] As long as those absolute monarchs were in rival and therefore they were required to strengthen their military power, their self-interests motivated them to achieve the final purposes of the society. This is because without an increase in the economic power they could not maintain a strong military power, and because economic activities are encouraged to grow under the condition that the state's power is conceded the legitimacy.

Sum up: The absolute monarch came into being as a victor of the inner wars among the regional kings and/or the manor war-lords, and the once semi-independent warrior-lords and the ex-regional kings who could survive

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[48] The firearm military system was systematically used for the first time in history, when Charles Ⅷ invaded into Italy in 1494. It is the victory of the Swedish King, Gustav Ⅱ Adolf, in the battle of Breitenfeld against the Habsburg in 1631 that the modern firearm military system brought the final end to the traditional feudal military system. See Howard (2009).

[49] As to the legitimacy of the sovereign power of the absolute monarch, see Lutz (2006) and Bodin (1576).

the inner wars became an aristocrat and served as the bureaucrat of an absolute monarch. The absolute monarch could end up the winner in the fight for survival by adopting a military system with innovative firearms before others. The firearms were the external shock-factor and could drastically tilt the military power balance toward the warring players who adopted them before others in rival. However, the standing army system with firearms could be maintained by financing the cost by resort to new economic power other than the traditional feudal economic bases. The new economic power originated in those people engaged in market-oriented business activities. They are, in particular, represented by those in oversea business and those in nationwide commerce, because of the hugeness of their business profits and of the indispensability of a military support for their business activities in distance places. The absolute monarch is the ex-regional king or the ex-war lord who could make success in combining the new economic power with the firearms before competitors in rival. The oversea traders who were militarily backed up by those absolute monarchs launched onto worldwide competition among them. They constitute of the ruling economic class. After the establishment of the absolute monarchy, the once-infantry soldiers in lower hierarchies of the military system adopted in the inner wars were freed from military service and specialized in the farming and new manufacturing business. They mainly consist of the ruled class. A part of them, in particular, small land owners and independent farmers, took on local governorship acting as a public official under the absolute monarchy. Later, capitalist manufacturers and traders came out from them as well as those people engaged in commerce business in cities.

Since market economy and mercenary system had been developing in the process of establishing the absolute monarchy, the cost to finance the new military system could be paid by precious metals represented by gold and silver. This is why the government of the absolute monarchy pursued the mercantilist policy. The state's power of the absolute monarchy originates in the armed force which is comprised of the professional standing army with the firearmed military system and was financially supported by the economic power generated by the oversea and nationwide trading business. It was,

furthermore, strengthened by the mercantilism policy which was pursued under a fiscal system managed by new aristocratic bureaucrats.[50] Under the absolute monarchy, domestic business activities also developed in the production and regional commerce of the necessity goods, which are characterized with bulky volume and cheap unit-price compared with luxury items traded in the oversea business. In order to claim the legitimacy of the state's power, the absolute monarchs had to achieve the ultimate purpose of the society, but their self-interests motivated themselves to adopt policy means contributing to achieving them because of an increase in the net revenues being followed.

From those market-oriented business people, the so-called industrial capitalists emerge, as a result of adaption to the next external shock factor—the "industrial revolution." They grow as a new economic power, but the traditional policy measures pursued by the absolute monarchs are in conflict with public policies required by the new economic class. When a political system under the absolute monarchy cannot satisfy the survival conditions of the new origin of the economic power, the absolute monarchs begin losing the legitimacy of the state's power little by little. A new state in the next stage, called the "nation state under bourgeois democracy," is divided into two types depending on whether a monarchy system called the "constitutional monarchy" is maintained or not.

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[50] The Ottoman Turk Empire which was established by the conquest of Constantinople in 1453 is also subsumed under the absolute monarchy, because it satisfies the essential conditions of the absolute monarchy. Two other Islam empires—the Mughal empire which started in 1524,and the Safavid dynasty in Iran which started in 1587 under the rule of the Shah Abbas I the Great—were also subsumed under the absolute monarchy. Both imitated the process of introducing the firearm system which had been adopted by the Ottoman Turks one century before. Japan established the absolute monarchy in the late 16th century after introducing the firearm system consisting of the matchlock handgun and artillery from Portugal in 1543. See McNeill (1999) as to the relation between firearms and the monarchy.

2.6 The Nation State under Bourgeois Democracy: The First-Stage Nation State

The existing conditions of the "nation state with the political system of bourgeois democracy" (for short, the first stage-nation state) are the emergence of the new industrial sectors the development of which in the last stage of the absolute monarchy were begun with manufactures with natural power and soon later replaced by steam power. Though new economic classes engaged in those manufacturing business had been developing a capitalistic employment system, they could not have such an overwhelming economic power as to play as the leading political role in the absolute monarchy. This is because the production system of those manufacturing businesses is based on natural energies and lacked of something more powerful.[51] It is steam power.

The external shock-factor of the first-stage nation state is the capitalistic production system with large-scaled manufactures moved under steam power. As an ideological reflection of such technological and economic innovations, the Enlightenment spread. From the view points of the newly-arising economic classes called "the bourgeois" *en masse*, the wealth could be much more increased by promoting the division of labor and free trades, that is, by peaceful economic means but not by appeal to the armed force. They believed that since the people can be connected in a spontaneous way through peaceful economic activities based on division of work, the war is not the inevitable destiny and rather a result of irrational behaviors based on false notions. The British free traders and the French physiocrats advocated such an idea on the

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[51] The series of political events in Britain, which was begun from the Puritan Revolution and ended with the Glorious Revolution, is a "revolution" in the sense that the property of the monarch was taken away more or less by violence as the French Revolution. Though, however, the ancestors of the later industrial capitalists, comprised of the gentlemen in low hierarchies, yeomen and city merchants, acted as the main engine of inner wars, they had to make a compromise with other classes with the more influential economic power. This is why those political events in Britain cannot yet be called the bourgeois revolution.

basis of economic analyses.[52] The Enlightenment served as an ideological factor which promoted the development of capitalism.

The bourgeoisie believed that the state's power originating in the professional standing army under the absolute monarchy had lost legitimacy, and that a new state should take over the state of the absolute monarch, on the basis of a new criterion to justify the legitimacy of the new state's power. This new form of the state is the nation state and the legitimacy of the new state's power is justified by the agreements of the main members of a nation. Those agreements are symbolized with ideological notions such as the liberalism and egalitarianism.

The opening stage of the first-stage nation state in Britain emerged in the processes of the Chartist Movement, in France after the so-called Revolution and in the U.S after the Independence War. Since employed workers and lower income classes were not reliable for bearing the cost to maintain the first-stage nation state, the bourgeoisie had to bear a higher share in the cost to maintain the new state. This is why the franchise was given to the bourgeoisie who could pay the taxes as the qualified condition, but not to those other working classes. The bourgeoisie were motivated to share the tax burden in return for the rights to participate in social decision-making and to protect their life, property and economic freedom. The British bourgeoisie could not abolish the absolute monarchy by violence, because their economic power could not overwhelm the one of the traditional classes. Therefore, they had to be satisfied with the acquisition of the franchise which could contribute to protecting the above-mentioned rights. This is why the first-stage nation state in Britain is under the "constitutional monarchy" but not under a republic system like the US and France.[53]

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[52] These ideas based on the economic principle are later reflected in the notions of international relations which are ramified to the Woodrow Wilson's "idealist" view based on the Kantian universalism and the Bull's "international anarchist" view based on the Grotius internationalism.

[53] The nation states which were established in Japan and Germany in the latter half of the 1800s also belong to the constitutional monarchy, though their parliaments were less powerful in electing the cabinet members and in

The traditional land owners and financial assets owners including the royal family, bureaucrats and industrial capitalists consist of the ruling economic classes. The constitutional monarch, politicians representing those economic classes, bureaucrats consist of the ruling political group. On the other hand, the ruled people of the first-stage nation state are the lower economic classes who are excluded from the franchise under the condition that they are exempted from paying property and income taxes. They are comprised of business people engaged in small-scaled sectors and employed workers in capitalist sectors. Even if the ruling political group is motivated to achieve the ultimate purposes of the society by their self-interests, the capitalist production system involves a conflict of interests not only between the capitalist and the employed workers in the economic arena but also among capitalists in an industrial sector. The conflict is doomed to arise when depression and unemployment are the inevitable result of the capitalist system. Then, they were the most serious threat to the legitimacy of the nation state under the bourgeois democracy.

2.7 The Nation State under the Mass-Democracy with Full Manhood Suffrage: The Nation State in the Second Stage

In this book, the nation state under the mass democracy with full manhood suffrage is called the "nation state in the second stage," whilst the nation state under the bourgeois democracy is called the "nation state in the first stage." The existing conditions of the former are the latter in the process of the second industrial revolution which begun in the late 19th century and ended with the two worldwide imperial wars.

The external shock-factors are the full opening of the second industrial revolution. The main industrial arenas where the technological innovations

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fiscal decision. Such a weaker political power of the bourgeois in the governmental decision-making reflected the underdevelopment of capitalistic sectors in those countries.

had been arising shifted to the heavy, chemical and machine industry from the traditional light industries represented by textile industry. The main energies shifted to electric power and oil from steam power and coal. Those new leading industries were so large-scaled that a joint-stock corporation system with limited liability is required to finance the huge cost of investment in those industries. The management system of such a joint-stock corporation changed from the capitalist-managing system in the age of the first industrial revolution into a new system called the "separation of ownership and management"

At the same time, drastic technological innovations arose also in the military system, in particular, in warship and land transportation. The warship was made from iron, equipped with big canons and moved under steam-engine power. The land transportation by railway moving under a steam-power could network their territories nationwide. Such innovations in the warship and railway system changed the balance of power among the front-running nation states in the era of the second industrial revolution, their rivals and trading counterparts in a subordinate position. Under such new circumstances, the Enlightenment was taken over by a new militarism— the imperialism— leading to colonial wars and pursuit of hegemony over other political organizations.[54]

This militarism is the second imperialism under the mass democracy since the Athens or Roman imperialism waged a series of war for conquest with the aim of establishing the hegemony over subjugate polis and colonized the subjugated regions under the political system assuring the demos 's right to sharing in the use of the state's power. The second imperialist war under the mass democracy, however, required a national-scaled military mobilization not only in personnel but in logistics, owing to the huge cost and the

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[54] The concept of the imperialism in this paper means the international strategies aiming to expand territories by conquer or by the suzerain-vassals relation and at least to establish hegemony over other countries. This terminology is different from the one defined by Morgenthow (1978) who defines it as a state's international tactics aimed at changing the existing balance of the power in a way more favorable to it.

large-scaled tendency of an imperial war. Therefore, the second imperialism war required the participation of manufacturing workers in military services, as well as the farming workers. Actually, their technical skills and work disciplines trained in the work places of large-scaled corporations were necessary for, and conducive to, the operation of the new weapons.[55] In order for them to concede the obligation of the military services, however, they had to be given sufficient incentives in return. The general male franchise was one of the incentives in addition to welfare services. In such a process the nation state in the second stage came into being.

The new economic power of the nation state in the second stage was generated by the new economic classes who are stockholders, managing workers (salary earners) and laborers (wage earners) in those large-scaled joint-stock corporations. Needless to say, the armed force with the above-mentioned new military system is the last resort to support the enforcing power. It is generated by combining the economic power of those economic classes as well as the traditional middle classes and landowners with the new military system. Political parties were reorganized so as to represent the interests of those new economic classes and to reconcile the interests of the traditional economic classes. Under a republic system or a constitutional monarchy system without the power, the state's power was exercised mainly by way of the political decision-making of those political parties which could succeed in organizing their supporters into a political majority. On the other hand, under the constitutional monarchy with a part of the state's power, the governing cabinet members are elected and are entrusted to exercise the state's power by constitutional monarch.

Under this new political system, whilst stockholders and managing workers in a high hierarchy joined in a coalition with the traditional asset owners and self-independent classes, wage earners are organized into a nationwide labor union and became the main pressure group of left-wing political parties. In the process of such a political polarization, though managing workers in the lower hierarchies of the management system are

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[55] See Gat (2008).

the majority of the managing workers, they remain un-organized so that they become the main pool of the so-called floating voters. As long as the ruling parties are representing the interests of the ruling economic classes, these managing workers in the lower hierarchy and the unionized laborers are the main ruled people of the nation state in the second stage. Under the second imperialism system with mass-democracy, however, those ruled economic classes share in net-gains gained by a series of imperialist wars by way of an improvement in economic wellbeing and of the stabilization of employment, just as the ruled people in the first imperialism system with mass-democracy were assured of economic wellbeing by sharing in war-booties gained by a series of the imperial wars. Therefore, those ruled economic classes of the nation state in the second stage conceded the legitimacy of the imperialist state, as long as their survival conditions are assured by the pursuit of the imperialist policy.

On the other hand, since the capitalist production system became more unstable in maintaining employment, the legitimacy of the state' power is more volatile to the criticism of the capitalist system. After military technologies entered into the more advanced stage characterized with combat aircraft, aircraft carrier, submarine, tank, and atomic bomb in the end, the nation states in the second stage plunged into the second worldwide imperialist war with the aim to secure more extensive markets and more resources by establishing a blocked colonial system. This imperial war ended with the victory of the anti-Axis powers, since it overwhelmed the Axis power by both the economic power and the military power.[56]

2.8 The Nation State under the Mass Democracy with the General Suffrage: The Nation State in the Third Stage

After the Second World War, the general suffrage spread out to the nation states under the mass-democracy with full manhood suffrage. This new type of the nation state is called the nation state in the third stage. The existing

[56] See Gat (2006).

conditions of this new type of the state are the nationwide mobilization including women for the Second World War and the welfare programs which were designed with the aim to contribute to mobilizing the working classes into the imperialist war under the pressure of communism. Those existing conditions are based on the not-so-different level of economic development from the one of the second-stage nation state.

The external shock-factors of the nation state in the third stage are an increase in the opportunity for women to participation in work place under the political pressure of communism. The participation of women in the capitalistic work places could increase the capability of women workers to pay taxes.

This third type of the nation state was more or less accompanied with the fiscal system of progressive taxations and welfare expenditures—called the welfare policy *en masse*—and an archetypical one of those states has been called the "welfare state." However, the terminology of the welfare state obscures the essential nature of the nation state in the third stage with respect to the concept of the state, since "how the enforcing power is generated" or "what the origins of the power are" is obscured by that terminology. Bearing in mind that the military power balance after the second world war lost the necessity of the nation-wide mobilization into a war due to high military technology and its mutual destructiveness, and that the origins of the state's power have not changed so much as to require a change in the share of the rights to political decision-making, the nation state in the third stage tilted balance between the political rights and obligations of the people in a way more favorable to the working classes in lower hierarchies. The balance is tilted more in that way, when those working classes are exempted from military service or substitutable public services. This criterion for the imbalance between the rights and obligations is based on the economic principle that the income distributions determined by free-market's operation are recognized as the criteria for judging the "just income-distributions," and are subject to the natural law. Such an imbalance was made possible by exercising the political pressure which is brought about only by the number size of the wage earners. In this sense, the third type of the nation stage

nation shares the same characteristics as the late Roman Empire where the citizens were exempted from military service as well as income tax but could be provided with both foodstuff for staple diet and entertainments free of charge. This makes other economic classes, in particular, the managing workers except for those in the top hierarchy, feel over-burdened. Therefore, it is inevitable that they tend to recognize the enforcing power of the nation state in the third stage as an illegitimate one. The more the population share of these over-burdened classes is, and the more contributive they are to an increase in the economic power of the nation state, then the more unstable the political system is. The nation state in the third stage has not yet been able to restore a proper balance between the political rights and obligations. The fiscal crisis is one of the phenomena caused by the problem of imbalance.

What kinds of policy measures, if the balance could be restored, are adopted? The main measures are as follows, below.

First of all, the managing workers, in particular, those with capability to innovate technologies and management, should be given the rights to choose the legal status of an independent entrepreneur, rather than the traditional one of an employed worker. Such a change in the legal status encourages them to promote an innovation in advanced technologies and more efficient management systems which is a key factor for survival in global competition. They constitute of the main income-tax payers. Low income classes, comprised mainly of the managing workers in lower hierarchies such as clerical workers and the wage earners, may be exempted from income taxes let alone wealth taxes, but in return for that exemption, they are restrained to join in the political decision-making on how to distribute indirect taxes represented by consumption taxes, but cannot join in the political decision on how to use the income taxes as well as wealth taxes which are not paid by those low income classes.

Secondly, the right to receive pension benefits is in proportion to how much to contribute the accumulation of a pension fund. The contribution may be judged not only by the amount of a pension payment but also by "how many offspring who can contribute to the accumulation of the pension fund in the future are reared." Other welfare programs are also reformed in the same

principle. For example, health insurance system is reformed to restore a balance between the preventive effort to keep health and the amount of an insurance payment.

Thirdly, the employers are obliged to assure the employed workers of their survival conditions, for example, by requiring the skill-enhancing program which can promote those workers to adapt to a change in technology.

Since the 1980s, a new type of welfare state is under experiment in some northern European countries such as Britain and Dutch. It is called the "third approach," according to which welfare services are not supplied free of charge — for example, the beneficiaries of unemployment insurance are obliged to be trained for taking jobs later, more generally speaking, beneficiaries of distribution policies are more disciplined to refrain from enjoying subsidized benefits. In this sense, the traditional mass-democratic system of a "continental type of welfare-state"[57] may share the spirits similar to those of the reformed democratic system with a rebalanced power-sharing, mentioned above.

2.9 The Autocratic State: Ahistorical State 1

The autocratic state should be conceptualized on the basis of what are the origins of the enforcing power, but not based on a difference in the historical age when it emerged or on a distance from democracy,[58]because it can emerge in various historical stages. It should be kept in mind that the enforcing power of the autocratic state is also generated by the political-military entrepreneur who can combine both of armed force and economic power into an enforcing power. However, the autocratic state is distinguished from other types of the state by a difference in the way to generate the enforcing power. In the latter case, the cost to finance the armed force in the process of a

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[57] See Esping-Andersen (1990) as to the modern welfare state and its classification.

[58] In this respect, the concept defined by Tullock (1987) is misleading.

state-building is financed mainly by the ruling economic classes who expect to gain so sufficient benefits as to be able to bear the cost burden after establishing a new state. In the case of the autocratic state, on the other hand, the exerciser of the enforcing power—a person in power—has also the economic power to financially support the armed force and bureaucratic organizations. Many of the modern autocratic states in common, for example, have a monopoly in basic industries such as energies and infrastructure sectors. Such a monopolistic position in those necessary goods gives the person in power not only the economic power to financially support the armed force but also the capability to affect the very existence of all people by controlling the provision of those necessary goods. In the case of the state of a non-autocratic type, the ruling classes, comprised of a political-military entrepreneur—a person in power—and the bureaucratic and military personnel to whom the use of the enforcing power are left by the person in power, are separated personally from the ruling economic classes. Therefore, the more the member size of a ruling economic class and/or the number size of the ruling classes, the less influential is the economic power of one member of those economic classes, and therefore the more democratic is this type of a state.

The autocratic state can be classified into two types as follows: The first one is those mineral-rich countries where the monopolized industries owned by a person in power have international competitiveness. If those monopolized industries are competitive in international markets—for example, fossil mineral resources of some Muslim countries—and therefore, sufficiently large net-revenues are obtained by the owner of those resources so sufficiently as to provide the ruled people with a means of livelihood and welfare services almost free of charge, the autocratic state of this type, though it may sound somewhat contradictory, can be benevolent to the ruled people, as exemplified by the Persian Arab Gulf states and Brunei. The second one is, by contrast, those countries where the monopolized industrial sectors are not competitive in international markets and therefore are required to be protected. The autocratic state of this type must be economically based on those non-exportable "government-owned enterprises," which should be called "the

ruling party-owned enterprises. As well as owned by the ruling group of the autocratic state, in order to self-finance the cost to generate the power, they must be managed by the bureaucrats who are not only a government official but also one of the ruling group or the agent of the principal "person in power." Whilst laborers and lower managing-workers employed by those party-owned enterprises are the ruled people, they concede, and lend tacit support to, the exercise of the autocratic state's power under the condition that they are assured of the survival conditions. However, since the whole pie to be shared is within a smaller limit in this second type of the autocratic state than in the first type of the autocracy, the political system of the second type more often teds to fall into tyrannical one, as exemplified by the self-proclaimed communist states. It should be noted that these autocratic states of the second type never grow to one of the modern democratic countries, as long as the origins of those states' power are not changed. Furthermore, it should be emphasized that any trade-relation between the private company of a democratic country and the ruling party-owned enterprise of an autocratic state is never freed from the influence of the diplomatic and military strategies pursued by the autocratic tyrant. Therefore, the second type of an autocrat state is doomed to be associated with a tyranny, but the first type is quite different from the latter in spite of both being non-democratic. This is why the autocracy should be conceptualized on the basis of "what are the origins of the enforcing power."

2.10 The Modern Empire-State: Ahistorical State 2

The empire state is those states which have such a sufficient incentive as to induce them to conquer other states and communities and/or to establish a hegemonic status beyond their original territories by appeal to the armed force. They pursue military and diplomatic strategies aimed at such an imperialist goal. The state of this type cannot be classified definitely in terms of the historic ages either, because whenever or wherever the conditions are met, it can appear over a various range of time and space. That is, if the power balance is tilted in a way favorable to a hegemony-pursuing country or

a suzerain-inclined one so drastically as to make itself prefer the acquisition by plunder or the one by rule to the acquisition by trade, it is inevitable for such a country to pursue the imperialist policy.[59] After the Second World War, it became much costly to carry out a war for conquest, which is the precondition of the acquisition by rule, because due to the irrecoverable destructive power of the military technology represented by atomic bomb, an appeal to war as the means to start the processes of governing a conquered territory has lost rationality. However, if conventional weapons can be advanced in so an effective way as to induce the hegemonic country to appeal to the armed force, an empire state can emerge even at the present time. Even if the nation states in the third stage are more widely and rigidly bound in the process of economic globalization and therefore the net-benefits obtainable from peaceful economic activities grow larger than an appeal to the armed force, it should be should be emphasized that those developments are assured by the balance of military power and that the preconditions of the power balanced are not fixed.

3. Concluding Remarks

In this chapter, I applied the main synthetic propositions of the evolutionary theory of the state to various types of the state appearing on the historical stage after the early state, after three generalized propositions were derived from the main synthetic propositions on the early state which are founded on recent historical, archaeological and biological study indispensable for understanding the essence of the state in the Kantian categorical frameworks. The three general propositions comprise the core theorems of the evolutionary theory of the state. I showed that the evolutionary theory is applicable to various types of the state appearing in human history later than the early state. It is needless to say that it remains to corroborate the

[59] Findley (1996) presented the first analytical framework to determine the territory size of the state of an empire type. However, since he neglected the acquisition by peaceful trade, the comparison between two means of acquisition was not made.

evolutionary theory by supplementing relevant historical details.

Taking up some problems for immediate solution, it is an urgent work to apply the main synthetic propositions to the problem of a state-building in conflict-torn countries and to the present international relations, *mutatis mutandis*. The state of a type and the political systems of a state should not be considered as a fixed factor or a fixed precondition. If the political system of a state cannot reconcile the self-interested policies carried out by the ruling members with the achievement of the ultimate purposes of the society, in other word, if those policies cannot satisfy the survival conditions of the main ruled people who are usually not only human resources in production and distribution but also military personnel in a military system, it becomes hard for the state to maintain the capability of achieving the final purposes of the society. It is because the economic power which financially supports the origins of the power is weaken by sticking to the contradictory or irrational policies which cannot achieve the final purposes. Then, the actual level of the state's power begins to decline, which furthermore, leads to a decline in the economic status, the diplomatic influence and the military power in international relations. In such processes the state losing the legitimacy is more exposed to threats both from outside and from inside. Many of the once-thriving states ruined in such a process in the end. Though it is sure that many of the conflict-torn countries and the states of an autocratic type are in such a situation, not a few democratic countries are not free from the situation.

Chapter 3
A Brief Review of the Traditional Theories of the State

In this chapter, the traditional theories of the state are critically reexamined from the view point of the evolutionary theory of the state. For limitations of space, the concept and the causality of the state are taken up as the main topics of this chapter.

3.1 The Traditional Concepts of the State

According to the state's concept offered by the evolutionary theory of the state, the state is one societal form of the "society itself." The society is the lasting substance which exists for the purpose of satisfying the "survival conditions of individual organs in common," called the ultimate purposes of the society in this book. It is because those survival conditions cannot be satisfied by one individual organ only why each individual organ chooses to belong to some form of the society. Any Kin-based community preceding the state is also one societal form of the society itself. Therefore, not only the kin-based community but also the state has to fulfil the ultimate purposes of the society. *That is*, any form of the society is fated to fulfil the ultimate purposes of the society and, if could not, it should lose a justification for existence. Therefore, whether or not the state is an entity achieving those ultimate purposes cannot be crucial for discerning it from the preceding kin-based communities. Likewise, in order to achieve those purposes, not only the state but also those preceding kin-based communities have also an enforcing power. This enforcing power should be also recognized to be "legitimate" in the sense that the main members of community agree to have it. Therefore, whether or not the state has the legitimate enforcing power cannot be crucial for distinguishing the state from those kin-based communities, either. The evolutionary theory argued that the distinction should be made by a difference in "who generate the enforcing power," and by a difference in "how the ultimate purposes are achieved."

The traditional theories of the state, except for the predatory theory[60] including the conquest theory, emphasize the realization of common interests as the justification for establishing a state. However, as long as those common interests are another expression of the ultimate purposes of the society, they emphasized only the reason for the existence of the society itself, but not a peculiar reason for the existence of the state. That is, the traditional theories of the state which naively seek a *raison d' dtre* for a state's existence in the achievement of the common interests have been confusing the state with the society itself. Therefore, they could not distinguish the state from the preceding communities in a conceptual way.

The contract theory of the state[61] has been considered to think little of the common interests as a state's *raison d'etre.* It is because they took precedence of the individualist judgment over any authorized one as the criteria for judging the exercise of the state's power. Whilst without the individualist judgment they will not accept any common interest imposed by any pushy above-authority, they do not reject the common interests themselves provided that they approve those in their own judgment. In fact, those proponents of the contract theory recognize, for instance, a defense against violent threats as one of the common interests, since they recognize it as common sense—one

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[60] The "predatory theory" later mentioned is a hypothesis on the selfish motives of a person in power, but not a concept of the state.

[61] The contract theory here mentioned is the theory of the state which was argued first by the 17th political philosophers represented by Hobbes (1651), Locke (1690) and Spinoza (1677), more or less based on the violent image of the nature in anarchy, intermediated by the 18th illuminatos represented by Hucheson (1747), Hume (1752) and Rousseu (1762), who could considered the state of nature in anarchy as the social circumstance in which each person can have some sympathy with others based on then-prevailing commercial networks of a cooperative nature, and finally accepted by the modern political philosophers represented by Rawls (1971), Nozick (1974) and Buchanan, each of whom is distinguished by their image of the state of nature in anarchy. The modern self-described proponents of the "common interest" theory of the state, represented by Hardin (1995) and Taylor (1982), are the same as those contract theory regarding the meaning of the common interests and the state's raison d' etre.

of the "natural rights"—that activities for defense bring about an incalculable value to any individual. However, those contractual concepts of the state, according to which the reason for existence is put on the common interests approved by their individualist judgment, are nothing but the concept of the society itself. Therefore, those concepts of the state cannot distinguish the state from any preceding kin-based community, as long as the latter was also destined to achieve the ultimate purposes of the society itself. Therefore, the contract theory of the state is an opinion on what a state should do, but not a proposition on what the state is, in the sense that it argues mere for the individualist logic of justification for the legitimacy of the enforcing power. According to the individualist logic, a person in power should not be conceded the legitimacy without the approval of the ruled people, which is made possible by satisfying the ultimate purposes of the society. Though the individualist logic is right, however, in order to justify such an individualist logic of justification they except for some illuminato political philosophers such as Spinoza(1677) and Hume (1752),[62] made some "ahistoric stories on the causality of the state," which aim to convince us that any type of the state is, and should be, built in accordance with their logic of justification. This is why the contract theory is obscure about a difference between the concept and the causality.

Though the ancient Greek philosophers represented by Plato and Aristotle appear to have imposed the common interests from above, they should be distinguished from the contract theory by their distinguishing the state—polis—from the preceding kin-based communities or by their emphasizing the objective existence of the common interests much more inclusive and cursive than the common interests of any kin-based community. They insist that the common interests of a state's members exist independently from each individualist calculus. Hegel (1824/25) and Ortega (1930, 1921) have the same concept of the common interests as those ancient Greeks and support for

[62] Hume rejected the existence of the "original contracts". He considered the state came into being by conquest, but that after conquest, the state's power has to comply with the principle of the contract in order for it to be conceded the legitimacy of the state's power.

nobles rule. The modern communitarians represented by Sandel (1982) and Taylor (1989), who are modern followers of the "objective common-interests" theory in the Aristotle tradition but based on the modern individualist approach, should be called the "individualist's objective common-interests" concept of the state.

The popular concept of the state defined by Weber (1911) may be one of the most authorized concepts of the state in social sciences. He emphasizes the legitimate nature of the enforcing power—he called it "a relative monopoly in violence." However, the definition is mere a description of the phenomena common to various types of the state. Furthermore, he overlooks the enforcing power of the kin-based communities, although those communities also organize their qualified members into an enforcing power or an armed force monopolized and legitimized by the main member of those communities.[63] Therefore, the notion of the state defined by Weber cannot distinguish the state from the preceding kin-based communities.

The popular Marxian concept of the state,[64] which argues that the state is an instrument to exploit lower classes, is the hypothesis on the state which has lost the legitimacy, i.e., has fallen to the political situation in which it is sure that a person in power cannot fulfill the ultimate purposes of the state. It should be called a hypothesis on tyranny, but not the concept of the state.

The "continuity principle" of Lowie (1962) is also based on the same failure in distinguishing the form of the society with the society itself. On the other hand, Fukuyama (2011) misleads us into recognizing the state as the centralized political system of an empire-state type.

In conclusion, what should be emphasized and kept in mind is that there can be the various forms of organization which achieve the ultimate purposes

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[63] The violence or armed force as the last resort to the "legitimated power to enforce" was more or less provided also by kin-based communities, even by primitive communities, as well as the chiefdom. As to the empirical study of the wars among the kin-based communities, see Chagnon (1974), Knauf (1991), Boehm (1993) and Gat (2008).

[64] See Engels (1878, 1884).

of the society, and that one societal form of the society emerges as a result of adapting to some peculiar circumstance with which a group of individuals in common are faced. Not only in order to distinguish the state form the preceding communities but also to discern one type of the state from other ones, we should focus on how the power to enforce is generated. It is because the enforcing power exists in any form of the society to fulfill the ultimate purposes but how to generate it is different among all forms of the society. From this evolutionary view point, a crucial difference between the state and the preceding kin-based communities lies in the change of the way to generate the power, from the "common-interests oriented" power whose cost is financed by the community members from the beginning into the "private-interests oriented" power whose cost is financed by political-military entrepreneurs in the beginning. Such a change was caused by the Bronze Revolution which brought about drastic innovations not only in economic arenas but also in military technologies and military systems. Those innovations motivated military-political entrepreneurs to launch onto war enterprises even at their expenses. The difference between one type of the state and other ones is also considered to lie in the change of the way to generate the enforcing power, as explained in the previous chapter. The traditional theories of the state failed to present a proper synthetic proposition explicating what the state is, because they could not take into allowance those empirical facts and did not subsume the concept of the state in the Kantian categorical frameworks.

3.2 The Traditional Hypotheses on the Causality of the State

The causality of the state is the synthetic propositions explicating why and how one type of the state came into being—usually called the "theory of the origin" of a state by the traditional theories. According to the evolutionary concept of the causality, which combines the Kantian causality category with the Aristotle's definition on the causality (α ι τ ι ο ν), it is comprised of the following factors: the existence conditions, external shock-factors, motives,

and results.[65] None the less, the traditional theories are satisfied with finding the origin of a state only in some of those causal factors, as shown in what follows, below.

The "predatory theory", named by North (1982), reduces the causality of the state to the motives factor, as long as we judge its argument from its emphasis on the self-interested motives of power-seekers, which boot up all of them to loot and conquer any defeated side.[66] However, the problem, "who were motivated to launce onto a state-building venture" is different from the problem, "whether a state was built by way of bargaining or by conquer. Whilst the latter copes with the problem of how to begin the process of a state-building, the former addresses the topic of who takes the initiative in building a state and of why someone takes it on. That is, the former is relevant to the process but the latter is related to the motive. The predatory theory, the most conspicuous form of which is the conquest theory represented

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[65] Strictly speaking, the factors of the causality defined by Aristotle's metaphysics include the teleological factor called the final cause, i.e., the ultimate purpose, which serves as initiative incentives for taking some action. However, the evolutionary approach subsumed the teleological factor in the factors of the concept, because it can be replaced with the motive factor and the innate adaption-mechanism, and furthermore because the teleological factor is more relevant to the category of the "substance and accident" relation, i.e., the relation between the society and the state.

[66] The predatory theory of the state consists of a very inclusive group as follows: the Marxian exploit theory (Engels, 1878;1884) based on the empirical work of Morgan (1877), the conquest theory of Oppenheimer (1926), the "rational bandits" theory of Olson(1993; 2000), McGire and Olson 1996)), the "rational Viking" model of Kurrild-Klitgaard and Svendsen (2003), the pirate model of St. Augustus which is the predecessor of the rational bandits model and the rational Viking model. Furthermore, the North's transaction-cost approach (1981), the conflict models of Skaperdas (1992) and Hirshleifer (2001), and Moselle and Polak (2001) also may belong to the predatory theory. The circumstance theory of the Caneiro (1970) should be also subsumed in the predatory theory, as long as he argues that an early state came into being as a result of aggressive wars for booties in spite of those wars being driven by some circumstance factors such as population pressure relative to limited arable and hunting lands.

by Oppenheimer (1926), is a hypothesis on the motives of power seekers and on the process of a state-building. It grasps some factors of the causality, but it I obvious that it is not sufficient to explicate why a state comes into being.

The circumstance theory of Carneiro (1970) is a hypothesis on the external factor which boots up the innate instinctive behaviors such as foods-seeking. As long as it is based on the self-interested motives, however, the circumstance theory should be considered to be subsumed in the predatory theory.

On the other hand, as just said in the previous subsection, the contract theory is *de facto* the logic to judge the legitimacy of the state's power. More strictly speaking, it is the logic of individualist justification for the legitimacy of the power. In order to explain the logic in a concrete way, they made the ahistoric image of the "state of nature" in anarchy on the basis of the hypothesis of self-interested human nature. Such ahistoric story has been confused with the causal theory, on purpose or not. Therefore, though arguments between the predatory theory and the contract theory appear antagonistic, they are in fact at cross-purposes. For, the former addresses the topic on the motive of power seekers and the one on whether the process of a state-building begins with conquer or bargaining but the latter on how to judge the legitimacy of an enforcing power, and therefore, the former topics are included in the causality factors but the latter is not relevant to the causality.

Plato (1941), Aristotle (1946, 1975), Hegel (1824/25, 1807)) and Ortega (1930) are some exceptions in the sense that they regard the state as a social entity locating on the top stage of the historical development of societal organization, that is, in the sense that they distinguished the state from other societal forms. However, they did not present a synthetic proposition on the causality, except Ortega who insists on the indispensability of a heroic political entrepreneur motivated for state-building.

By the way, the existence of various societal forms at the same point in time and interrelations among them can be conceptualized in a consistent way, if they are subsumed under the Kantian interrelationship-category. Only under

the Kantian interrelationship category, it is recognizable firstly that the sovereignty or sovereign power of a state is relative to the power of other state which is influential in an international relation, secondly that the territory size of a state is determined on the basis of the benefit and cost" calculus,[67] and thirdly, therefore, that a state with lesser power and even a kin-based community can coexist with an imperial state at the same time-period.

[67] As to the rational model of an imperial territory size, see Findley (1996).

Chapter 4
A Game Model of the Origin of the State

In this chapter, the main propositions on the early state are corroborated by analyzing a game model abstracted from the essential elements in the process of building an early state, and the evolutionary theory of the state was derived from the "causality propositions of the early state" explicating why and how the early state came into being, and from the "concept propositions" explicating what the early state is. It is confirmed that the early state is one form of the society and it is proved that the early state emerged as a result of adaption to the Bronze Revolution which motivated a military entrepreneur type of chieftains to bear not only the cost of maintaining a bronze-weapon system but also the cost of governing conquered territories at their expenses.

1. Introduction

Ueda (2014) derived the general propositions on the state from two synthetic propositions on the early state—the synthetic proposition of the causality of the early state and the one of the concept. Whilst the former proposition explicates why and how the early state came into being, the latter explains what the early state is. Both could be derived by subsuming the relevant empirical studies of biology, archaeology and anthropology under the Kantian categorical frameworks. They are called the "evolutionary theory" in the sense that the genes mechanisms are epigenetic and that the mutationism is based on the modern emergence hypothesis. The adjective "evolutionary" is inevitable, because the causality and concept proposition, if based on the relevant empirical works, are fit to formulate in the essential terms of the above-mentioned evolution theory such as substance, adaption, motive, innovation, enterprise and external shock factor. Finally but not the least, synthetic proposition on interrelationship among various societal forms or types can be inferred as a corollary from those two propositions. It explicates why various societal forms can coexist in the same time-period and what factors determine the size of a territory.

In order to confirm the above synthetic propositions, the main contents are summarized below.

Firstly, Homo sapiens have the four means of acquisition to satisfy the survival conditions of an organ individual and its offspring, in particular, to acquire necessities to satisfy the instinctive desires. They are the acquisition by their own production work, by trade, by plunder and by rule. Which one is chosen at a historical stage depends on the "benefit and cost" relations, and the means which brings about the biggest net-benefits tends to be selected. The acquisition by rule is inevitably corresponds to the historical stage when the state emerged.

Secondly, the state is one accidental form of the society itself, and the society is the substance which exists in order to actualize on a satisfactory level the common purposes of organ individuals—the protection from both external and internal threats, the satisfaction of instinctive desires, and the maintenance of social systems contributing to the fulfillment of the above two purposes—with any of which it is hard to tackle only by an individual organ. It was a common sense that though it is indispensable to fulfill those purposes for the survival of organ individuals, it is hard to achieve them only by the effort of one individual organ. It is why, without actualizing those purposes on a satisfactory level, the ruled people would not concede a person in power the "legitimacy of the state's power."

Thirdly, the state cannot be distinguished from preceding kin-based communities without making clear a difference in who generates the power to enforce and the one in how it is generated. Likewise, various types of the state cannot be discerned without differentiating who generate the power of those states.

Fourthly, as a result of adaption to the Bronze Revolution,[68] an early state

[68] Strictly speaking, it should be called the First Bronze Revolution, whose military technology is characterized with clubs equipped with a bronze head or a hardened copper head and/or with bronze or hardened copper axes. On the other hand, the second bronze revolution which arose in the latter half of the BC 1000s is characterized with a horse-drawn buggy driven by an aristocrat warrior and his retinue.

emerged from the kin-based communities networked with wide-spreading external trades in the last stage of the Neolithic ages, by way of an intermediate stage of the chiefdom society. The chiefdom is distinguished from the preceding tribe community by a change in the means of acquisition from the acquisition by trade into the one by plunder. The First Bronze Revolution motivated a political-military entrepreneur type of chiefs and military officers in the tribe communities to take on the cost of the armed force equipped with a new bronze-weapon system at their expenses. This is because, thanks to the military imbalance brought about by adopting innovative bronze weapons, net-benefits gained by plunder could exceed those by trade. However, the chieftain is not yet called a "king," because the aim of war is to loot war booties but not to secure tributes by a regular rule. The chiefdom is transformed into an early state, when net-benefits obtained by ruling a conquered territory surpass those by plunder. It is because, if that benefit-cost condition is met, the chieftain is motivated to change the existing societal form into an early state. Such an increase in the net-benefits can be realized, if the economic productivity of the conquered territory under the rule is increased so sufficiently as to induce the chieftain to rule but not loot the territory, and if the increase in the productivity is brought about by adapting the bronze revolution to the production process.

Fifthly, the size of a territory is determined by the border where the benefits obtainable from ruling an additional unit of territory are just balanced with the cost to rule it. Therefore, various types of societal forms can co-exist in the same period, as long as an increase in the net-benefits is limited.

Finally, the above main propositions derived from the early state were generalized to the "evolutionary theory of the state" by proving that they are applicable *mutatis mutandis* to other types of the state appearing on the later historical stages than the early state (Ueda 2014).

However, it remains to formalize the process of building the early state in an analytical framework and to derive the analytical results corroborating

those synthetic propositions. In this chapter the above synthetic propositions on the causality of an early state are corroborated by analyzing a game-theoretic model abstracted from the main factors essential for the process of building an early state.

For this purpose, *first of all*, those essential factors are summarized and reduced to the following historical conditions: The existing condition of the early state is a chiefdom society and that of the chiefdom is the tribe-community in the last stage of the Neolithic ages in which the kin-based communities had been engaged in wide-spreading external trades. A pasturage tribe-community and an irrigation tribe-community are the original kin-based communities engaged in an inter-community trade in the Neolithic ages, each of which is organized into one kin-based community with a stone-weapon system under the leadership of a chief. The division of work between those two communities or those industries is the first division of work after human beings began agricultural production.[69] Those kin-based communities are just around a corner of the chiefdom stage, in the sense that the external trade is so widely spreading that private property is being accumulated even under a stone-made "tool and weapon" system.[70] The Bronze Revolution is the most impactive external shock-factor and it motivated a political-military entrepreneur type of the chiefs and military officers to take on the cost of maintaining an armed force with a bronze-weapon system at their expense, because by adapting to the revolution, they could gain bigger net-benefits than in the existing kin-based system by changing the means of acquisition from the acquisition by trade into the one by plunder. Those political-military entrepreneurs of the pasturage tribe had an advantage in adapting to the bronze revolution, thanks to their higher

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[69] See Gat (2008), chapter 9.

[70] The empirical evidence of the first private property is given by the stone-made seal of Harafian culture in the Pottery Neolithic ages, developed in the north Mesopotamia, Syria and Anatolia area in the BC 6000 to BC 5500. See http://www.tellhalaf-projeckt.de. I quote it from Ridley (2010), chapter 4.

movability and advantage in transportation capability. Then, they became chieftains of the chiefdom. Furthermore, when the net-benefits—net tributes—gained by applying the bronze revolution to production processes in a conquered irrigation-agricultural territory could exceed those by plunder, then the chieftains was induced to change themselves into an early king. Then, as a result, an early state came into being in human history on a rational basis.

Secondly, in order to make an analytical model, the above historical process of building an early state is begun with describing an inter-community trade between a pasturage tribe-community and an irrigation agricultural one. That external trade is divided to the following two stages: the organizing stage and the transacting stage. In the organizing stage, the community members are organized into a cooperative group. The organizing processes are formulated by applying the "link and claim" game of Slikker and Nouweland (2001). The stability of those communities is supported by the existence of the strong Nash equilibrium. On the other hand, the transacting stage is formulated by a two-stage bargaining game abstracted from the essential characteristics of the inter-community transactions. They are carried out by the chiefs who bargain to conclude the terms of trade, on the assumption that the military power is maintained in a balanced condition due to both being equipped with stone weapons. The terms of trade are determined by way of a two-stage bargaining process. The military power balance is crucial for the determination of the terms of trade, because those agents engaging in the external transactions were usually accompanied with armed guardians. Since the relative military-power is influenced by the combination of military technology, economic power and solidarity sense, the probability of winning in conflict, which is the mathematical expression of the relative military-power, is defined by a specific conflict success function (CSF, hereafter) *en masse*. It is defined as an increasing function of economic power, solidarity sense, and relative advantage in military technologies. As a starting-up condition, the relative military-power balance between those two kin-based communities is assumed to be a given probability of winning in conflict.

Thirdly, from the above model it is derived that the combination of an innovation in the military and production technology with an emergence of the new economic power capable to finance the cost of an innovative weapon system drastically changes the bargaining power or CSF. Then, the peaceful trade is taken over by the acquisition by plunder on the basis of the "benefit and cost" calculus. The emergence of the chiefdom and that of the early state are analytically corroborated by deriving the conditions under which a military entrepreneur type of the chief (chieftain) is motivated to take on the cost of a bronze-weapon system (the cost of a bronze-weapon system plus the cost to rule the conquered irrigation community). In order to corroborate the emergence of the early state, however, one more necessary condition is required, which distinguishes the early state from the chiefdom. Since the acquisition by rule means that the early king gains tributes or taxes replacing the conventional "one-off war booty" gained by plunder, the net gains by rule must be larger than the one by plunder, in order to motivate the chieftain to change the means of acquisition from the one by plunder into the one by rule. For this economic condition to be met, the economic productivity of the subjugated irrigation community after being conquered must increase so sufficiently high as to assure the conqueror of an increase in the net benefits obtainable from collecting tributes or taxes by rule. Such an increase in the economic productivity is the economic precondition for those tributes or taxes to be paid on a contract basis, or for the early king to engage in the economic management of the subjugated territory. As a corollary, the size of the territory is determined on the same rational basis.

In what follows, this chapter is organized as follows: In the second section, as the base model preceding the chiefdom and the state, the organizing stage of each preceding tribe-community which is in the last stage of the Neolithic ages just around a corner of the chiefdom age is formulated in the analytical framework of a "link and claim" game. In the third section, the base model of the stage of an external transaction between two types of communities is set up by applying a two-stage bargaining game, and the process of bargaining is examined by analyzing the base model and some analytical results relevant to characterizing the inter-community trades are derived. In the fourth, the

CSF is specified so as to reflect historical reality, and the bargaining processes in the chiefdom and in the early state are examined and compared. In the fifth section, the analytical results corroborating the main synthetic propositions on the early state are derived. The last section concludes this paper and derives some academic implications on how to apply to other forms of the state.

2. The Two Base Models: A Pasturage Community and an Irrigation-Agricultural Community

In this section, the two types of tribe-communities which are typical just around a corner of the chiefdom age in the Neolithic ages are taken up and the processes of organizing a group of members into one community are formulated and examined in the analytical framework of "link and claim" game. Those two types of tribe-communities are a pasturage tribe-community and an irrigation agricultural tribe-community. The first subsection deals with the process of organizing a group of members in the pasturage tribe-community into one economic unit. The second deals with the process of organizing a group of members in the irrigation agricultural tribe-community into other one economic unit. Such a division into two types of kin-based communities reflects the original division of work among kin-based communities in the Neolithic ages after Homo sapiens developed agriculture.

2.1 The Base Model of a Pasturage Tribal-Community

In this subsection the base model of a pasturage community is set up. For this purpose, what follows is begun with positing the basic assumptions on the pasturage tribe-community in the last stage of the Neolithic ages.

Assumption 1: Production Function

A pasturage tribe-community consists of players numbered $(0,1,\ldots,n)$, the number "zero" of which is assigned to a player taking the role of the pasturage-tribe's chief. The chief has already some private property which has

been accumulated by way of his engaging in inter-community trade. The product of this tribal community is a set of grass-grazing livestock. The output is an increasing function of the work efforts which are made by those n member-players other than the chief. The production is subject not only to the effect of the diminishing-returns law in a given grazing land but also to the "increasing-returns" effects of the military power on the size of grazing land marked as territory. Furthermore, the ordinal economic life of the pasturage tribe-community is accompanied with war-training activities, so that they can engage in a war without much additional cost to prepare for the war. Therefore, it is assumed that the population size of the pasturage tribe is crucial to influencing the military power with a given military technology and economic productivity.

Whilst the effect of the diminishing-returns law in a limited grazing land brings about the negative sign of the second derivative, the effect of the increasing territory-returns brings about the positive sign of the second derivative as well as that of the first derivative. Taking into account an overwhelming influence of the pasturage-tribe's military power on the territory size, in what follows the total effects of the population size on the second derivative is assumed to take a positive sign. Here, the work efforts are approximated by the member-size on the assumption that each member works a given-hour year in return for the consumption of a given amount of the livestock outputs and a given volume of the grain-foodstuffs provided by the pasturage-tribe's chief. Denoting the net-outputs of the livestock—the gross products less the fixed amount for the workers' consumption—by y, the relation between the net-outputs and the work efforts substituted by the population size acting as their proxy are formulated by Eq. (2-1).

(2-1) $y = f(n), \quad f' > 0, \ f'' > 0.$

In Eq.(2-1) the positive sign of the second derivative is based on the assumption that the increasing "land-returns" effects of population on the grazing territory overwhelm those on the diminishing "work-returns in a given grazing land" effects.

The population is a Malthusian increasing function of foodstuffs represented

by grain-foodstuffs on the assumption that a fixed amount of livestock and a fixed amount of grains are consumed by each pasturage member for their subsistence. Denoting the quantity of grain-foodstuffs by x, the Malthusian relation between the population and the foodstuff is formulated by Eq. (2-2).

(2-2) $n = \varphi(x),\ \varphi' > 0,\ \varphi'' > 0.$

The grain-foodstuffs are acquired by way of inter-community trade with an irrigation-agricultural community defined in the next subsection. Provisionally, the terms of trade are denoted by a generic symbol, *P*.

Assumption 2: Cooperative Payoff

The whole cooperative-payoff is the net-outputs of the grazing livestock which are defined as the total net-output,y, less the fixed cost of production other than those consumed by the pasturage workers. The production cost of raising livestock is approximated by the cost of the grain-foodstuffs provided for the pasturage members on the assumption that the work efforts of each pasturage member are fixed at a given hour-year. Denote the total cooperative payoff by v and take Eq.(2-2) into consideration, and then those assumptions are formulated by Eq.(2-3) or (2-3)'.

(2-3) $v = v(n) = f(n) - \mathrm{P} \cdot \varphi^{-1}(n);\ \ v(n) > 0\ \ for\ n \geq 2.$
(2-3)' $v = v(x) = f\{n(x)\} - Px.$

Since at least two players, one of which is the chief, have to cooperate in order to engage in this livestock-raising, the more concrete expression of Eq. (2-3) is that $f\ (n) > 0\ for\ \ n \geq 2;\ f(n) = 0\ \ for\ n \leq 1$. From Eq. (2-3) and (2-2), the first derivative and the second one are given by Eq.(2-3)."

(2-3)"$v'(\mathrm{n}) = f'(\mathrm{n}) - \mathrm{P} \cdot (\varphi^{-1})'(n) > 0$, and $v''(n) = f''(n) - \mathrm{P} \cdot (\varphi^{-1})''(n) > 0$.

The super-additive condition of the cooperative payoff is assured by the

positive sign of the second derivative of $v(n)$ as well as the positive sign of its first derivative.

The optimal level of P is a decreasing function of the bargaining power which we assume is approximated by the probability of a win in conflict—concretely speaking, approximated by Conflict Success Function (CSF, for short), defined in the fourth section. Denoting the probability of winning by λ in a generic term, the optimal level of P is provisionally defined by Eq. (2-4).

(2-4) $p = \delta(\lambda),\ \delta' < 0.$

Assumption 3: Payoff Functions and Equilibrium Conditions

Regarding the payoff functions of the pasturage member-players, we make the following assumptions: By way of an inter-community trade with the irrigation agricultural community, the pasturage chief acquires a quantity of grain-foodstuffs,x, at a price P in generic terms under the condition of the probability of winning being a given parameter λ_0. Denoting a generic number size of member-players by n, the pasturage chief provides each of those n members with a fixed volume of grain-foodstuffs as well as a fixed amount of livestock. In return for those grain-foodstuffs, those n members work a given-hour year to bring about the net-output amounting to $f(n)$. This "give and take" relation between the pasturage chief and the member-players makes the "benefit and cost" of each pasturage-member just balanced. In the total net-outputs of the grazing livestock, 100α percent is reserved as the chief's revenue and the rest of the outputs, $100(1-\alpha)$ percent, are allocated to those n members. This allocation system is based on the member's privilege called the "equality principle" of sharing foods for other use than the consumption of foods. Denote the chief and any other member-player by the number *0* and i respectively, and furthermore, their payoff functions by the function π_0 and π_i respectively, and then, their payoff functions are defined by Eq. (2-5) and (2-5)' subjected to the total net-payoff constraint Eq. (2-6) and to the participant constraints which require to exceed or at least be equal to the cost of survival, normalized to zero.

(2-5) $\pi_{0=}\pi_0(\mathrm{n}) = \alpha f(n) - P \cdot \varphi^{-1}(n) \geq 0.$

(2-5)' $\pi_{i=}\pi_i(n) = \frac{1-\alpha}{n} f(n) \geq 0,\ i \in (1, 2, \dots, n).$

(2-6) $v(n) = \pi_0 + \sum_{j=1}^{j=n} \pi_j.$

It should be noted that in the above definition Eq. (2-5)', the burden of the work efforts made by each pasturage member except for the chief is cancelled out by the consumption of both the fixed amount of livestock and the fixed volume of grain-foodstuffs provided by the chief.

In the next paragraph, it is shown that the above payoff-allocations can be supported by the strategy profile of a "link and claim" non-cooperative game, the strategy-sets of which are denoted by C^j and C^{-j}, $j \in (0,1, \dots, n)$, and C^j is the strategy of the j player and C^{-j} is the strategy profile of other players than the j player, for $\mathrm{j} \in (0, 1, \dots, n)$.

Payoff-Allocation in a "Link and Claim" Game

Taking historically-specific relations between pasturage-tribe's chief and other tribe's members into account, we construct a simple "link and claim" game model which is abstracted from the process of organizing a group of pasturage member-players into one economic unit.

First of all, the chief has to organize a group of tribe members into one cooperative economic unit by inducing them to join in it. For this purpose, he makes an approach to those members one by one and makes "give and take" offers to them. Those offers are expressed by the strategy set of the chief, and that strategy set consists of a combination of rights and obligations. Generally, the chief's strategy set includes such contract-offers to some members as to show no intention to make contract with those members. In this subsection, however, it is worthwhile to focus on the following special strategy of the chief: It leads the chief to forming direct networks with a group of member-players with n size and claiming 100α percent of the total cooperative net-payoff as the payoff allocations to him, under the condition that, in order to make up for

the work-efforts of a given-hour year, he provides them with grain- foodstuffs at an *ex ante* stage. Concretely speaking, he claims that if the member-players are consist of n members, each member-player pays him back $100\alpha/n$ percent of the cooperative net-outputs of grazing livestock which are held in each member's grazing lands after they consumed a given percent of the total output.

On the other hand, the strategy set of each member-player consists of the similar claims to the chief and other member-players. Like the set of the chief, generally, the strategy set of each member-player includes such strategies as to show no intention to form a network with a part of those member-players. However, it is worthwhile to pick up one special strategy as the candidate of the Nash equilibrium best corresponding to the special strategy of the chief focused in the above. This strategy is as following: Any member-player claims that the chief assures him of his payoff allocation, π_i, $\mathrm{i} \in (1,2,\dots,\mathrm{n})$, defined by Eq.(2-5)'under the condition that the grain-foodstuffs as well as the given percent of the livestock outputs are provided in order to just make up for the given-hour work. To other member-players, he does not make any claim, which is expressed with the "zero" element in his strategy set.

The combination of the above-mentioned special strategies is formulated by Eq. (2-7) and (2-7)'.

(2-7) $C^0 = \left(0, \frac{\pi_0}{n}, \dots, \frac{\pi_0}{n}\right)$

(2-7)' $C^i = (\pi_i, 0, \dots, 0),\ i \in (1, \dots, n).$

The Core, the Strong Nash Equilibrium and Political Stability

The allocations satisfying Eq. (2-7) and (2-7)' are the core of the cooperative payoff-allocations,[71] and furthermore, it is obvious that the strategy profile defined by Eq.(2-7) and (2-7)' is the Nash equilibrium of the above "link and claim" game. Thus, the core allocations are supported by the Nash equilibrium.

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[71] As to the procedure of the proof, see Slikker and Noueweland (2001).

Furthermore, if $\pi_0 = 0$, then the Nash equilibrium is the strong Nash equilibrium. In the above model, the existence of the strong Nash equilibrium is assured.[72] This means that if the strong Nash equilibrium profile is realized somehow, not only any member-player but also any group of the member-players has no incentive to deviate from their strategies. A political system achieving those payoff allocations satisfies a necessary condition for political stability, in the sense that neither member-player nor any group of the member-players can improve their wellbeing by deviating from the cooperative economic unit. Such an egalitarian allocation system explains why many kin-based communities preceding the chiefdom were kept in order.[73] However, the chiefdom society and the state loose the necessary conditions of the strong Nash equilibrium, as long as the persons in power are inclined to pursue a positive share in the net-outputs.

2.2 The Base Model of Irrigation-Agricultural Community

In this subsection, the base model of an irrigation-agricultural community is set up and the process of organizing it into an economic unit is formulated in the analytical framework of "link and claim" game similar to the one of the pasturage community. It is assumed that the agricultural community is comprised of the chief numbered zero and m member-players, whose number-size "m" is generic number. What follows is begun with positing the basic assumptions on an irrigation-agricultural community.

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[72] As to the mathematical proof, see Theorem 4.2 of Slikker and Nouweland (2001). The existence of the strong Nash is assured by the condition, $v(1) = 0$, which was assumed in Eq.(2-3). As to the procedure of proving the existence, see Theorem 4.3 of the above paper.

[73] Some royal families of the constitutional monarchy with a democratic political system originate in the chief of a kin-based community. Such a monarchy system tends to maintain a political stability in the sense that the monarchy is supported by the majority members of the state. This is because an egalitarian principle, except for gorgeous expenses necessary for the public activities of royal family, is agreed between the monarch and the commoners.

Assumption 1: Production Function

On the assumption that each member-player works a given-hour year to produce grains and that an agricultural-tribe's chief constructs and maintains an irrigation system at his cost, the output of agricultural products are determined by way of an increasing function of the number-size of farming member-players, subject to the law of diminishing work-returns in a given irrigated land. Denoting the output level and the production function by y_A and f_A respectively, the relation between the agricultural products and the inputs of work efforts is defined by Eq. (2-8).

(2-8) $y_A = f_a(m),\ f_A' > 0,\ f_A'' < 0.$

Each member-player shares 100c percent in the agricultural products y_A, and it is given by the agricultural-tribe's chief. The allocation system of this community is designed so as to assure that the benefits obtained by each farming worker's share in the agricultural products exceed, or at least be equal to, the burden of his work-efforts. The burden is normalized to zero on the assumption that the burden of the work efforts made by each farming member is a given hour-year. The cost of survival is represented approximately by those work efforts. An allocation share just matching with those work-efforts represents approximately the opportunity cost of each farming member.

Next, the cost of irrigation system is denoted genetically by K. The cost of constructing and maintaining an irrigation system with a given capacity is dependent on the level of technology, genetically denoted byγ. It is higher in the stone ages than in the bronze ages. Denoting the stone-age technology and the bronze-age technology by γ_S and γ_B, respectively, the causal relation between the cost to construct and maintain the irrigation system with a given capacity and the technology is defined by Eq. (2-9).

(2-9) $\mathrm{K} = \mathrm{K}(\gamma),\ \gamma \in (\gamma_S, \gamma_B),\ and\ \mathrm{K}(\gamma_S) > K(\gamma_B).$

Assumption 2: Cooperative Payoff and Payoff Functions

Taking the above *Assumption 1* into consideration, the cooperative payoff and the payoff function of the chief and those of other member-players are defined by (2-10), (2-11) and (2-11)' in turn.

(2-10) $v\,(m) = f_A(m) - K(\gamma) > 0.$
(2-11) $\pi_0^A = \pi_0^A(m;\,\gamma) = (1 - cm)f_A(m) - \mathrm{K}(\gamma) \geq 0,$
(2-11)' $\pi_i^A = \pi_i^A(m;\,\gamma) = cf_A(m) \geq 0,\ \mathrm{i} \in (1,2,\dots,\mathrm{m}).$

The optimal number size of the farming member-players is determined by the agricultural-tribe's chief who maximizes his payoff. Assuming the inner solution, it satisfies the necessary condition given by (2-11)."

(2-11)" $(1 - cm)f_A'(m) = cf_A(m).$

The above equation means that the marginal benefit gained by hiring one additional farming-worker is equal to the marginal cost to hire him.

Assumption 3: The Organizing Process framed by a "Link and Claim" Game

In a "link and claim" game played by the agricultural chief and the m members, we focus on a special strategy profile, as in the "link and claim" game of the pasturage-tribe community. Denote the strategy of the chief and that of any i member by C_0^A and by $C_i^A, i \in (1,2,\dots,m)$, respectively, both of which are a vector with $(m+1)$dimensions. And then, a special strategy profile is defined by Eq.(2-12) and (2-12).'

(2-12) $C_0^A = (0, \pi_0^A/m, \dots, \pi_0^A/m)$..
(2-12)' $C_i^A = (\pi_i^A, 0, \dots, 0),\ i \in (1,2,\dots,m).$

By the same mathematical procedure as in the case of the model of the pasturage-tribe community, it is showed that the payoff allocations defined by (2-12) and (2-12)' are the core of the cooperative payoff-allocations satisfying the allocation condition (2-10). Furthermore, the core-allocations are supported by the strong Nash equilibrium, as in the case of the

pasturage-tribe community. The existence of the strong Nash equilibrium is assured, on the assumption that $f_A(m) > 0$ for $m \geq 2$ and $f_A(m) = 0$ for $m \leq 1$, as in the case of the pasturage community.[74]

3. The Base Model of an Inter-Tribal Trade between Pasturage Community and Irrigation-Agricultural Community

In this section, the process of an inter-community trade between the pasturage tribe and the irrigation-agriculture tribe is formulated by applying a two-stage bargaining game.[75] On the assumption that if in the process of an inter-tribunal trade in the Neolithic age a conflict happens to arise, the probability of the pasturage-tribe's winning is a given parameter, λ_0, the optimal level of the terms of trade is dependent on λ_0. The assumption that the probability of winning is a given parameter is based on the historical background that those trading parties in the Neolithic ages are equipped with a stone-weapon system, and therefore that the military powers were in balance. The military power balance in the Neolithic ages justifies the assumption that those two types of communities engage in a peaceful trade. In what follows, we begin with positing some assumptions to set up the base model describing the process of bargaining in the inter-tribal trade.

The game model is framed by a two-stage bargaining game between the irrigation-agricultural chief and the pasturage chief. The pasturage chief transacts with the agricultural chief in order to exchange the grazing livestock raised by the pasturage community for the grain-foodstuffs grown by the agricultural community. Since the raising in the pasturage tribe is subject to the increasing "returns" law, the pasturage chief seeks to increase the member size as much as possible. Therefore, the demand for the grain-foodstuffs is more influenced by the population pressure of the pasturage community or by the military demand for warriors. If the member

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[74]The proof follows the same line of the logic as for the pasturage community.
[75] The original model was designed by Querido (2007) in order to explain why a war breaks out.

size of the pasturage community is a given parameter and it is denoted by n, then, according to Eq. (2-2) the demand for the grain-foodstuffs, denoted by x_0, is determined by the following equation: $x^0 = \varphi^{-1}(n),\ \text{for}\ \exists\, n.$

At the first stage of the two-stage bargaining game, the chief of the agricultural community offers the terms of trade to the pasturage chief. The terms of trade is denoted by P in terms of grains. If the pasturage chief accepts the offer, the transaction is completed and the payoff of the pasturage chief and those of the pasturage members are defined by Eq. (3-1) and (3-1).'

(3-1) $\pi_0(x^0) = \alpha\, f\{n(x^0)\}\ - Px^0 \geq 0.$

(3-1)' $\pi_i(x^0) = \frac{1-\alpha}{n} f\{n(x^0)\} \geq 0,\ i \in (1,2,\dots,n).$

In this transaction,the agricultural chief gains the payoff defined by Eq.(3-2).

(3-2) $\pi_0^A \equiv \pi_0^A(m{:}\, x^0,\ K(\gamma_S)\ ) = (1 - cm)f_A(m) - K(\gamma_S)\ + U^A(Px^0) - x^0.$

In the above, $U^A(Px^0)$ is the utility that the agricultural chief can enjoy by obtaining the livestock, $\mathrm{P}x^0$, which is acquired through a peaceful trade with the pasturage chief. The functional form U^A may include the form of unitary coefficient.

On the other hand, if the pasturage chief rejects the offer, the game shifts to the second stage where the peaceful bargaining process stops and enters into the second stage called a conflicting process, as described below.

At the second stage, the pasturage chief compares the payoff gained by accepting the offer price, i.e., $\pi_0\{n(x^0)\}$ defined by Eq.(3-1), with the expected payoff obtainable from choosing a conflict under the condition of the given probability of winning, λ_0. This expected payoff, denoted by $\mathrm{E}(\pi_0) \equiv E(\pi_0{:}\, \lambda_0)$, is defined by Eq. (3-3).

(3-3) $\mathrm{E}(\pi_0{:}\, \lambda_0) = \lambda_0[\alpha\, f\{n(x^0)\} + B]\ + (1 - \lambda_0)[\,\alpha f\{n(x^0)\} - \mathrm{P}x^0 - \beta].$

The above definition of the expected payoff is based on the following assumptions: If the pasturage chief wins, he can loot x^0 without payment, which is used to raise the outputs of $f\{n(x^0)\}$ and to gain $100\,\alpha$ percent of those outputs, and furthermore he can gain some additional war booties denoted by B. If otherwise, he has to pay to the agricultural chief not only Px^0 to acquire x^0 but also some compensation denoted by β. [76]

The optimal level of the offer-price for the agricultural chief is determined by increasing P as highly as possible. It is obvious from his payoff function defined by Eq.(3-2). However, since according to Eq. (3-1), the payoff of the pasturage chief is a decreasing function of the price, the optimal price for the agricultural chief is set at the level where $\mathrm{E}(\pi_0: \lambda_0) = \pi_0(n(x^0)) \equiv \pi_0(x^0)$, because at this maximum price level the pasturage chief prefers the peaceful trade to the conflict and somehow accepts the offered price.

Denoting by P^0 the optimal price under the condition that the probability of winning in conflict is given by λ_0, it is determined by solving the following equality, $\mathrm{E}(\pi_0: \lambda_0) = \pi_0(x^0)$, which, after rearrangement, is reduced to Eq. (3-4).

$$(3\text{-}4) \quad P^0 = \frac{1}{x^0}\left[\frac{\beta(1-\lambda_0)}{\lambda_0} - B\right] \equiv \delta(\lambda_0: x^0).$$

By inserting Eq.(3-4) into Eq.(3-1) after P is replaced by P^0, the payoff of the pasturage chief with the optimal price P^0 is given by Eq.(3-5).

$$(3\text{-}5) \quad \pi_0(x^0) = \alpha f\{n(x^0)\} + B - \beta(1-\lambda_0)/\lambda_0.$$

From the comparative analysis of Eq.(3-5), it is obvious that the payoff of the pasturage chief at the optimal price is increasing in the war booty, B, the probability of winning, λ_0, the allocation share,α, and the population,$n(x^0)$,

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[76] The pasturage tribe has a military advantage in the "hit and run" war tactics. This is why even if defeated, they are not completely destroyed and they can return to a transaction table after paying some compensation.

but is decreasing in the war compensation,β. Those results confirm the ubiquitous historical experience that the larger the probability of a win in conflict is and the bigger the war booty is, and the less the war compensation is, then, the more incentives for plunder is given to the pasturage-tribe's chief.

Finally, in the beginning of the first stage of the two-stage game, it has to be proved that it is actually rational for the agricultural-tribe's chief to choose the peaceful trade and to offer the optimal price, P^0, at the beginning of the first stage. It is proved by comparing the payoff obtainable from the peaceful trade, denoted by $\pi_0^A\,(P^0{:}\,x^0)$ which is derived from Eq. (3-2) after replacing P with P^0, with the expected payoff obtainable from choosing the conflict at the second stage, denoted by $\mathrm{E}(\pi_0^A{:}\,\lambda_0)$. Of course, the former must be larger than the latter. If he is involved with the conflict, he suffers from some additional war cost which could be ignored in the case of the pasturage community.[77] Denoting that additional war cost by D, the expected payoff of the agricultural chief is defined by Eq.(3-6).

(3-6) $\mathrm{E}\ (\pi_0^A{:}\lambda_0) = (1-\lambda_0)[(1-mc)f_A(m) - K(\gamma_S) + U^A(P^0x^0) - x^0 + \beta - D]$

$$+\ \lambda_0\ [(1-mc)\ f^A(m) - K(\gamma_S) - x^0 - B - D].$$

The above definition corresponds to the definition of the expected payoff of the pasturage chief. It means that if the agricultural chief wins, he can force the pasturage chief to pay P^0x^0 in return for x^0, but if otherwise, he has to proffer both x^0 free of charge and the war booty, B. Based on this definition, the optimality condition for the agricultural chief is derived from the rationality condition for the agricultural chief to accept the peaceful trade. It is the following inequality condition: $\pi_0^A\,(P^0{:}\,x^0) \geq \mathrm{E}(\,\pi_0^A{:}\,\lambda_0)$. This

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77 This is because whilst the ordinal economic life of any pasturage tribe-community is accompanied with war-training activities, so that they can engage in a war without any noticeable additional cost, the economic life of an agricultural community does not include factors of a war-practice without an increase in the physical power.

inequality relation is reduced to the condition (3-7).

(3-7) $\pi_0^A\ (P^0 : x^0) - \ \mathrm{E}(\pi_0^A : \lambda_0)\ = E\ + \lambda_0\{U^A(P^0 x^0) + B + \beta\} - \beta \geqq 0.$

It is obvious that if the war compensation,β, is small enough, the rationality condition is satisfied. This sufficient condition is met, as long as the "hit and run" tactics of the pasturage tribe can work efficiently in peace talks after they could not win. The efficiency of such tactics is familiar and it supports the historical experience that agricultural communities usually prefer the means of acquiring necessities by trade to the one by plunder, and tend to avoid being involved in any external conflict.

4. The External Trade of a Chiefdom Society and that of an Early State

The positive effect of λ_0 on the pasturage chief's payoff may well induce him to pursue an increase in the probability of a win in conflict. However, he could not effectively increase it, as long as, under the condition of other factors influencing the probability such as population and solidarity sense being given, the military system of the pasturage tribe-community has to be equipped with a conventional stone-weapon system reflecting the technological constraints of the Neolithic ages. Then, the balance of military power was maintained and it induced not only the agricultural chief but the pasturage chief to stick to peaceful trade as the means of acquisition, and discouraged them from falling into a military conflict and from changing the means of acquisition from the acquisition by trade into the one by plunder. In this section, we take into allowance the effects of military technology, economic power and internal solidarity on the bargaining power in an external trade between the pasturage society and the irrigation-agricultural community. For this purpose, CSF is formulated by taking those effects on the bargaining power into consideration. In what follows, the bargaining power defined by CSF acts as a proxy for the military power or the enforcing power of a chiefdom society and that of an early state, and external transactions in

the chiefdom era and the early state era are examined under the condition that the bargaining power is changeable through the effects of a change in the military technology, economic power and solidarity sense. We derive not only the conditions for the pasturage-tribe's chief to prefer the chiefdom to the existing tribe-community but also those for the chieftain to prefer an early state to the chiefdom. The basic synthetic propositions of the evolutionary theory of the state are corroborated by deriving the analytical result that it is rational for the pasturage-tribe's chieftain to change the existing chiefdom into an early state. However, if the traditional tribe's chief is replaced with a chieftain or an early king and win in conflict, the definition of war booty must be changed. So, this section begins with specification of the war booty.

4.1 War Booty in the Chiefdom Era and in the Early State Era

A chieftain takes so-called "one-off looting" tactics. If these tactics are applied to attacking the agricultural community defined in this chapter, the pasturage chieftain tries to loot the whole net-outputs of the agricultural community by one attack. Though this is an annihilating tactic and is usually called myopic, it is shown that those one-off looting tactics have a rational basis under some conditions. Denoting by B^C the war booty gained by the pasturage chieftain, it is defined by Eq. (4-1), where it is assumed to be larger than B.

(4-1) $B^C = f_A(m) - K(\gamma) > B,\ \gamma \in (\gamma_S, \gamma_B).$

On the other hand, a new military system with bronze weapons strengthens the armed force. The strengthened armed force brings about an increase in the military power or the probability of winning. The CSF serves as a proxy for the military power or the probability of a win in conflict. The pasturage chieftain is induced to finance the cost of adopting this new military system at his expense. If the cost to maintain the new military system is approximated by the cost of acquiring the bronze quantity of which new weapons as well as new tools are made, the payoff function of the

pasturage chieftain engaging in a peaceful trade with the agricultural tribe-community, π_0^C, is generically defined by Eq. (4-2).

(4-2) $\pi_0^C = \pi_0^C(n,z) = \alpha f(n,z) - P\varphi^{-1}(n) - P_z z.$

In the above equation, z means the bronze quantity and P_z means the cost to acquire one unit of the bronze, respectively. Here, it is not relevant to discuss on how and where to acquire the bronze. The production function is modified so as to reflect, if any, the positive effects of the bronze innovation on the production process of livestock farming. Whilst these positive effects of the bronze innovations on the production are one of the factors determining the economic power, the positive effect on the military technology is reflected in the CSF in a direct way.

On the other hand, an early king stops taking the one-off looting tactics preferred by the chieftain, and adopts the fourth means of acquisition, i.e., the acquisition by rule. Under "the acquisition by rule" system, the defeated side concedes to pay various forms of taxes to the early king at regular periods in return for protection from the ex-chieftain's capricious plunder as well as from internal and external threats. A social organization adopting this fourth acquisition system should be distinguished from the existing chiefdom society. Denoting by T, σ and B^E the ruling period, the discount factor and the taxes in the era of an early state, in turn, war spoils gained by an early king are replaced with taxes revenues collected by the early state. The relation between the war booties and the taxes are defined by Eq.(4-3).

(4-3) $B^E = T = \frac{1-\sigma^T}{1-\sigma} \cdot \{(1-mc)f_A(m) - K(\gamma) - G\},\ \gamma \in (\gamma_S, \gamma_B).$

The above tax system defined on the second right side of Eq.(4-3) reflects the historical experience that if it is too costly to rule or govern a conquered territory, as usually so in a territory with large population and autarkic economic bases, the people in the conquered side are allowed to live, even if the "ex-person in power" is replaced by a new ruling group, under the

condition that those people concede the new rule system. The symbol G in the above (4-3) represents the cost of ruling the conquered agricultural community, though this cost was not required in the case of the pasturage chieftain's pursuing the plunder tactics. In the fifth section, the cost of ruling is concretely defined so as to reflect the additional cost to manage the production process of the conquered territory. Furthermore, it is assumed as an increasing function of the bronze quantity which acts as proxy for engaging in the economic management.

By the way, the payoff function of the pasturage early-king, if engaging in a peaceful trade with the agricultural community, is denoted by π_0^E, and may as well be assumed to take the same form as that of the pasturage chieftain. It is given by Eq.(4-4), for caution's sake.

(4-4) $\pi_0^E = \pi_0^E(n,z) = \alpha f(n,z) - P\varphi^{-1}(n) - P_z z.$

4.2 The Conflict Success Function after the Bronze Revolution

According to the common sense view of the recent empirical study on wars and international relations, the most influential factors of the military power are the following three: military technology, economic power and internal solidarity sense.[78] If these factors are taken into allowance, the conflict success function can be defined, in generic terms, by Eq.(4-5), (4-5)' and (4-5)".

(4-5) $\lambda \equiv \lambda(n,z;\theta) = F(n,z)/[F(n,z)+\theta].$
(4-5)' $F(n,z) = (zn)^{\mu},\ 0 < \mu < 1,\ s.t.,z > 1.$
(4-5)" $\theta = \theta(z),\ \frac{\partial\theta}{\partial z} < 0,\ \partial^2\theta/\partial z^2 > 0,\ \partial^2\theta/\partial z^2 \approx \infty\ for\ z > z^*.$

In Eq.(4-5) the combination of population size with bronze quantity, $F(n,z)$, which is defined by n multiplied by z in (4-5)', act as a proxy for the economic power on the assumption that the work efforts are determined by

[78] See Gat (2008) as to the inclusive study on the military power.

the population size under the condition that each pasturage member-player works a given-hour year, and at the same time that the bronze revolution has positive effects on the productive process of livestock farming. In Eq.(4-5)', z is subject to the constraint that $z > 1$ in absolute terms. This technical constraint is required to reflect both the positive effects of the technological innovation on the economic power and the phenomena that an increase in the output per worker is expressed by a coefficient with more than one unitary number.

In (4-5)", θ represents the relative advantage of the irrigation-agriculture community in the military technology over the pasturage community. It is a decreasing function of the bronze weapon system adopted by the pasturage chieftain, and is approximated by bronze quantity acquired by the pasturage chieftain. The negative sign of the second derivative of $\theta(z)$ follows the "as usual" assumption on normal benefit functions. Furthermore, because when a new military system is introduced, the state-of-the-art military technology tends to be adopted, it may be assumed that $\theta(z)$ get to a flat line just on the right to some "optimal level of the military power," which is achieved at z^*.

The parameter, μ, is a proxy for the solidarity sense of the pasturage society. The solidarity sense is influenced by how a person-in-power exercises the enforcing power—how much legitimate the enforcing power is—and the achieved level of the legitimacy is approximated by how the payoffs are allocated. However, in what follows, it is assumed for simplicity that it is a given parameter, for simplicity. The signs of the first and second derivative of λ ant those of $F(n, z)$ are derived as given by (4-6).

(4-6) $\partial\lambda/\partial q > 0,\ \partial^2\lambda/\partial q^2 < 0;\ \partial F/\partial q > 0,\ \ \partial^2 F/\partial q^2 < 0,$ for $q \in (n, z);$
$\partial\lambda/\partial\theta < 0,\ \partial^2\lambda/\partial\theta^2 > 0,\ s.t.,\ \theta'(z) < 0.$

4.3 External Trade between the Pasturage Chieftain and the Agricultural Chief

The chieftain emerged from a kin-based community preceding it, as a result of adaption to the First Bronze Revolution. This is because the bronze innovations gave the ex-chiefs of the tribe-communities lucrative incentives

for adopting a bronze-weapon system even at their expenses. More concretely speking, it is because a new military system equipped with bronze weapons brought about an increase in the probability of a win in conflict, and therefore, the net-benefits obtainable from choosing the option of conflict could increase so much as to induce those ex-chiefs to stick to the conflict option, whenever they are engaged in external trades with the traditional agricultural communities which still maintain the out-of-fashioned military system equipped with stone weapons. In this section, in order to examine the process of bargaining in the external trade between the pasturage chieftain and the chief of the traditional agricultural community, first of all we derive the conditions under which the expected payoff of the pasturage chieftain is larger than the payoffs gained by trade. As the precondition, the relation (4-7) is assumed to hold.

(4-7) $\lambda \equiv \lambda(n, z: \mu) \geq \lambda_0$.

The expected payoff of the pasturage chieftain, denoted by $\mathrm{E}[\pi_0^C]$, which is gained by his choosing the conflict option in the external transaction, is defined by Eq.(4-8).

(4-8) $\mathrm{E}[\pi_0^C] = \lambda[\alpha f(n,z) - P_z z + B^C - D] + (1-\lambda)[\alpha f(n,z) - P\varphi^{-1}(n) - P_z z - \beta - D]$.

$= \alpha f(n,z) - (1-\lambda)P\varphi^{-1}(n) - P_z z + (\beta + B^C)\lambda(n, z: \mu) - (\beta + D)$.

In the above definition, the war compensation,β, and the additional war cost, D ,are assumed to be the same as those of the former pasturage tribe-community, for simplicity, though they may well decline thanks to an increase in the military power. These more realistic assumptions strengthen the robustness of our analytical results. The pasturage chieftain is distinguished from the ex-pasturage tribe's chief by an increase in the military power which induces him to stick to the conflict option. Such a difference is formulated by the inequality relation (4-9), or (4-9)' derived from

arranging (4-9).

(4-9) $\mathrm{E}[\pi_0^C] \geq \pi_0^C(n, z; \mu)$.

(4-9)' $\mathrm{P}\varphi^{-1}(n) \geq \frac{1}{\lambda}(\beta + D) - (\beta + B^C)$, or, $\{\beta + B^C + Px^0)\lambda(n, z{:}\mu) \geq \beta + D$.

From (4-9)', it turns out that the pasturage chieftain is more promoted to choose the conflict option by the following two encouraging factors, with ß and D being given. The first one is an increase in the probability of winning, λ, which leads to a decline in the price of foodstuff, P. The second is an increase in the war booty, B^C, which also leads to a decline in the grain-foodstuff's price.

On the other hand, the expected payoff of the agricultural-tribe chief is smaller than the one obtained by sticking to the peaceful trade option. Therefore, he offers the pasturage chieftain the terms of trade satisfying the equality, $\mathrm{E}[\pi_0^C] = \pi_0^C(n, z; \theta)$, from which the optimal price for the agricultural chief is derived and given by Eq. (4-10).

(4-10) $\mathrm{P}x^0 = \frac{1}{\lambda(n,z:\mu)}(\beta + D) - (\beta + B^C),\ s.t.,\ \varphi^{-1}(n) = x^0$.

The optimal condition of the agricultural chief has to satisfy the following relation: $\mathrm{E}[\pi_0^A] \leq \pi_0^A$, where π_0^A is defined in the same form as Eq.(3-2), and $\mathrm{E}[\pi_0^A]$ is defined by Eq.(4-11).

(4-11) $\mathrm{E}[\pi_0^A] = \lambda[-\mathrm{D}] + (1 - \lambda)[\pi_0^A - D + \beta]$.

The above definition of the expected payoff of the agricultural-tribe's chief corresponds to the war booty of the pasturage chieftain defined by Eq.(4-1). It means that if the agricultural chief is defeated, all of the net-outputs of the agricultural community are taken away. Furthermore, it is assumed for simplicity that the additional cost to engage in a war is the same as that of the

pasturage chieftain.[79] By re-arranging the above condition (4-11), the optimal condition of the agricultural-tribe's chief is reduced to the inequality condition (4-12).

(4-12) $\lambda\,(n, z; \mu\,) \cdot (\pi_0^A + \beta) \geq \beta - D.$

By comparing the rationality condition of the pasturage chieftain defined by (4-9)' with the optimality condition of the agricultural chief defined by (4-12), it turns out that whenever the former holds, the latter also holds, if it is assumed that the war compensation is set at an amount around the war cost. It is because that assumption assures the relation, $\beta - D \approx 0$. Historical experiences show that the additional war cost of the agricultural community is large relatively to the one of the pasturage community, because daily economic activities of the latter can serve as a military training but the military training of the former contradicts with their daily economic activities. On the other hand, the war compensation paid by the pasturage side tends to be small thanks to their high movability and the efficiency of their "hit and run" tactics. Therefore, the right side of Eq.(4-12) may be ignorable or may well be negative. This inference strengthens the robustness of the above argument that if (4-9)' holds, then, (4-12) also holds.

4.4 External Trade between Pasturage Early King and Agricultural-Tribe's Chief

The rationality condition for a pasturage early-king to choose the conflict option is defined by the relation (4-13) or its reduced form (4-13)', both of which are *mutatis mutandis* the same form as the relation (4-9) and (4-9)'.

(4-13) $\mathrm{E}[\pi_0^E] \geq \pi_0^E(n, z;\ \mu).$

[79]If the opponent is pasturage chieftain, the additional war cost of the agricultural chief may well increase. If taking this more realistic assumption into allowance, the optimality condition holds more robustly.

(4-13)' $\{(B^E + \beta) + P\varphi^{-1}(n)\}\,\lambda(n, z{:}\,\mu) - \beta - \mathrm{D} \geq 0,$ or

$$\mathrm{P}x^0 \geq \frac{1}{\lambda(n,z:\mu)}(\beta + D) - (\beta + B^E),\ \ s.t.,\ .\varphi^{-1}(n) = x^0.$$

In the above (4-13), $\pi_0^E(n, z;\ \mu)$ is defined by (4-4) and $\mathrm{E}[\pi_0^E]$ is defined by the following Eq. (4-14).

(4-14) $\mathrm{E}[\pi_0^E] = \lambda\,[\alpha f(n,z) - P_z z + B^E - D\,] + (1-\lambda)[\alpha f(n,z) - P\varphi^{-1}(n) - P_z z - \beta - D]$

$$= \alpha f(n,z) - (1-\lambda)P\varphi^{-1}(n) - P_z z + (\beta + B^E)\lambda(n, z{:}\,\mu) - (\beta + D).$$

On the other hand, the expected payoff of the agricultural-tribe's chief is defined by (4-11). It was defined on the assumption that that when defeated, the agricultural chief is confiscated. Therefore, the optimality condition of the agricultural-tribe's chief is defined by the following relation: $\mathrm{E}[\pi_0^A] \leq \pi_0^A$, and it is reduced to the relation (4-15) which is the same form as the relation (4-12).

(4-15) $\lambda\,(n, z;\ \mu) \cdot (\pi_0^A + \beta) \geq \beta - D.$

By comparing (4-13)' with (4-15), it turns out that on the assumption that $\beta \approx D$, the optimality condition of the agricultural chief is always met, if the rationality condition of the early king is satisfied. The assumption, $\beta \approx D$, can be justified as was done in the case of (4-12).

4.5 The Optimal Military Power in the First Bronze Revolution Era

This subsection focuses on the starting point in the first stage of the two-stage bargaining game, and derives the optimal quantity of bronze—the optimal military power, in the end—determined by the pasturage chieftain and by the early king. This is because just at the beginning of the first stage of the two-stage bargaining game, both the chieftain and the early king have to make decision of the optimal amount of bronze. In the analytical framework

of the starting point set up in what follows, the bronze quantity acquired by the pasturage chieftain and the one by the early king, both denoted by z, act as a proxy for the positive effects of the bronze revolution not only on economic productivity but also on military technology.

The Optimal Military Power for the Pasturage Chieftain

As a preliminary to the examination of the optimal military power or the optimal bargaining power, represented by the CSF, we begin with examining the optimal terms of trade for the pasturage chieftain. It is determined by solving Eq. (4-9), or by equating π_0^C with $\mathrm{E}[\pi_0^C]$. Denoting the optimal terms of trade by $P^* = P(n, z; \mu)$, Eq. (4-16) and (4-16)' are derived after inserting Eq. (4-5)' and (4-5)"into (4-5).

(4-16) $P^* x^0 = \frac{1}{\lambda(n,z:\mu)}(D + \beta) - (\beta + B^C),\ \ s.t.,\ x^0 = \varphi^{-1}(n).$

(4-16)' $\lambda(n, z: \mu) = \frac{(zn)^\mu}{\theta(z)+(zn)^\mu}$.

If the terms of trade, P, which was given tentatively by Eq.(2-4), is replaced with P^*, it turns out from (4-16) and (4-16)' that $P^* \equiv \delta(\lambda)$ and $\delta' < 0$. Therefore, the assumption (2-4) is confirmed and furthermore, since $\partial\lambda/\partial z > 0$, it is derived that $\partial P^*/\partial z < 0$. Regarding the effects of the parameter μ on λ, since from Eq.(4-5)', $F(n, z: \theta(z), \mu) = (nz)^\mu$ and from Eq.(4-5)' $\partial\lambda/\partial F > 0$, it is proved that F is an increasing function of μ, as shown by the following relation: $\frac{\partial F}{\partial \mu} = (nz)^{\mu-1} + \mu(nz)^{\mu-1} log(nz) > 0$. Those results are summarized by the two main analytical propositions as below.

The First Analytical Result of the Static Analysis

The effects of the bronze revolution on the military power or bargaining power, which are achieved through an increase in the economic productivity and the military technology, are positive. More strictly speaking, the bronze-led technological innovations, approximated by the quantity of bronze,

bring about an increase in the military power or the bargaining power in the external trade—a decrease in the grain-foodstuff's terms of trade—on the assumption that an increase in the military power is achieved by the combination of an increase in the productivity with an increase in the military technology, subject to the constraint that the solidarity sense is given.

The Second Analytical Result of the Static Analysis

The effects of the solidarity-sense on the military power are positive. More strictly speaking, an increase in the solidarity-sense brings about an increase in the military power or the bargaining power, *ceteris paribus*.

Though it is hard to say definitely what factors determine the solidarity sense, it is sure that the solidarity sense is generally fermented through the long process in which cooperative cultures put down deep roots in a societal form. That the enforcing power of the societal form meets the legitimacy conditions is one of the necessary conditions for such cultures to be established.

Now, we can derive the optimal military power for the pasturage chieftain. By inserting Eq. (4-16) into π_0^C at the optimal price level, Eq. (4-17) is derived.

(4-17) $\pi_0^C(n,z:\mu) = \alpha f(n,z) - P_z \cdot z + (B^C + \beta) - \frac{(\beta+D)\{(zn)^\mu+\theta(z)\}}{(zn)^\mu}$.

The necessary condition of the inner maximization, subject to the condition of z being positive, is given by (4-18) and (4-18)'.

(4-18) $\frac{\partial\pi_0^C}{\partial z} = \alpha\frac{\partial f}{\partial z} - P_z - (D+\beta)\frac{\partial(\frac{1}{\lambda})}{\partial z} = 0$, or $P_z = \alpha\frac{\partial f}{\partial z} - (D+\beta)\frac{\partial(\frac{1}{\lambda})}{\partial z}$.

(4-18)' $\frac{\partial(\frac{1}{\lambda})}{\partial z} = \frac{n^2 z\{(z-\mu)(\theta'-\theta)}{(nz)^{2\mu}} < 0$, for $z > 1$.

From (4-18) and (4-18)' the conditions for the optimal military power for the pasturage chieftain to be determined are derived and summarized as Lemma 1, below.

Lemma 1: The Optimal Military Power for the Pasturage Chieftain

The optimal quantity of bronze—a proxy for technological innovations in the first stage of the Bronze Ages—is determined so as to equate its marginal cost given by P_z to the sum of the marginal effects on the pasturage revenue and those on the decline in the foodstuffs' terms of trade brought about by an increase in the military power. In other word, the optimal level of the military power, approximated by the winning probability of the pasturage chieftain, is determined so as to equate the marginal effects of the bronze-led technological innovations on the increase in the bargaining power to its marginal effects on the revenues from pasturage production less the marginal cost of those innovations, denoted by P_z.

The Optimal Military Power for the Early King

Under the condition that the production function of the agricultural community is the same, the optimal level of the military power for the early state is determined along the same line of logic as the chieftain, *mutatis mutandis*. First of all, the payoff of the early king at the optimal terms of trade is derived by inserting the equality form of Eq.(4-13)' into Eq.(4-4). It is given by Eq.(4-19).

(4-19) $\pi_0^E(n, z{:}\,\mu) = \alpha f(n, z) - P_z z + (\beta + B^E) - (D + \beta)/\,\lambda(n, z{:}\,\mu)$, and
$\lambda(n, z{:}\,\mu) = (zn)^{\mu}/\{(zn)^{\mu} + \theta(z)\}$.

From the necessary condition of the inner maximization, subject to the constraint that z is positive, Eq. (4-20) and (4-20)' are derived.

(4-20) $\frac{\partial \pi_0^E}{\partial z} = \alpha \frac{\partial f}{\partial z} - P_z - (D + \beta)\frac{\partial(\frac{1}{\lambda})}{\partial z} = 0$, or, $P_z = \alpha \frac{\partial f}{\partial z} - (D + \beta)\frac{\partial(\frac{1}{\lambda})}{\partial z}$.

(4-20)' $\frac{\partial(\frac{1}{\lambda})}{\partial z} = \frac{n^2 z\{(z-\mu)(\theta' - \theta)}{(nz)^{2\mu}} < 0$, for $z > 1$.

From Eq.(4-20) and (4-20)', on the assumption that the production function of

the agricultural community is the same, the conditions for the optimal military power for the early king to be determined are derived and summarized as the third analytical result.

The Third Analytical Result: The Optimal Military Power for the Early King

On the assumption that a change in the production function of the agricultural community is ignored, the optimal level of the military power for the early king, approximated by the probability of a win in conflict, is determined so as to equate the marginal cost of a technological innovation, given by P_z, to the sum of both the marginal effects on the revenues obtainable from pasturage production and the marginal effects on the decline in the foodstuffs' terms of trade.

4.6 Recapitulation of the Process of Forming a Chiefdom Society

As a preliminary to corroborate the main synthetic propositions of the evolutionary theory of the state, in particular, those propositions on the "causality category" which explicates why and how the state came into being, in this final part of the fourth section the analytical results derived in the previous subsections are applied to the historical process of forming a chiefdom society.

The existing conditions of the chiefdom are as following: that a pasturage-tribe's chief at the last stage of the Neolithic ages had been engaged in an inter-community trade with a neighbor agricultural tribe-community to acquire grain-foodstuffs by way of a peaceful trade. The population is dependent on the amount of the gain-foodstuffs in accordance with the Malthusian law. Since the population size is also a proxy for production level and military personnel supported by the production, it is a crucial factor of the military power. Furthermore, since the more strengthened the military power is, the more increased the bargaining power is, the pasturage-tribe's chief is motivated to acquire the grain-foodstuffs as much as possible, subjected to the "benefit and cost" constraint. On the other hand, the means of acquiring necessities by trade is chosen on the basis of the rational calculus by both

sides of the inter-community trade. It is because the military systems of both types of tribe-communities are not free from a stone-weapon system having less lethality than a metal-weapon system, and therefore because the cost of a war enterprise is too high to gain the positive net-revenues from the war enterprise, except for a successful surprise attack. At some point in time and in some place, the pasturage-tribe's chief found out a way to apply the bronze revolution to military system as well production process, and could increase not only productivity but also military power. Higher movability seems to have given him an advantage in adopting those innovative results earlier than the stationary irrigation-agricultural community. If he appeals to the armed force equipped with bronze-made weapons for the more advantageous terms of trade in the process of bargaining in the inter-community trade, he could expect that his payoff obtainable from choosing the conflict option becomes so large as to induce him to stick to the conflict option, whenever he engages in the external trade with the agricultural-tribe's chief guarded by the conventional stone-weapon system. Faced with such a new circumstance in which the opponent trading counterpart has the much higher probability of winning in conflict, the agricultural-tribe's chief offers the disadvantageous terms of trade in exchanging his agricultural products for the opponent's grazing livestock. The optimal level of the terms of trade falls down and is settled at the level where the pasturage-tribe's chief just refrains from looting the agricultural chief and therefore the agricultural chief is actually subjugate to the pasturage chief. Speculating on a rise of the net benefits obtainable from the conflict option, the pasturage chief are more and more driven to acquire bronze as much as possible and in the end he determines the optimal level of the bronze quantity so as to maximize his payoff based on the rational calculus.

At the beginning of the organizing stage, the pasturage-tribe's chief determines whether he launches into organizing the members of the pasturage community into a cooperative economic unit by forming a network with them. Since the bronze-led innovations bring about a sufficient increase in the payoff obtainable from plunder, there exist sufficient economic incentives inducing him to bear the cost of a military system equipped with

bronze weapons at his expense and to start up the organizing process.

As a result of such adaption to the bronze revolution in the first stage of the Bronze Ages, the chiefdom emerged from the traditional kin-based community, and since then, the chief of a kin-based tribe-community became a chieftain of the chiefdom society. An early state emerges from the chiefdom society, when the chieftains are motivated to change the means of acquisition from plunder into rule. In order to explicate such a change, the logic must be framed by the causality category. In the next section, the process of transforming the chiefdom into an early state is analyzed under the categorical framework of the causality.

5. Transformation of the Chiefdom into an Early State

In this section, the causal propositions on the early state are corroborated by deriving relevant analytical results from the two-stage bargaining game. The causal propositions explicate why and how an early state emerges from the preceding chiefdom society. For this purpose, however, some revisions on the base model, in particular, those on the production function of the agricultural community conquered by the pasturage early king, are required, because the early king launches into the economic management of the conquered territory under his rule.

5.1 Revised Production Function of the Agricultural Community

From the comparison of Eq.(4-18) with Eq.(4-20) the optimal level of the military power for the early king may seem, actually appears, to be set at the same level as for the chieftain. This correspondence occurs because a change in the contents of the production function of the agricultural community was not taken into allowance. That is, it is due to the assumption that though the bronze revolution brings about an innovation in both the military technology and the production technology of the chiefdom society, it does not so an increase in those of the subjugated agricultural community. Strictly speaking, it is due to ignoring the familiar observation that a conquer state governs a

territory conquered by it. In fact, the states in a conqueror position usually launch into the management of economic activities in the subjugate territories after constructing a political and administrative system to rule them. Such an economic management implies that those technological innovations are applied to the production process in those subjugate territories. Therefore, the production function of the subjugated community—the irrigation-agricultural community in this chapter—should be reformulated so as to take the effect of those technological innovations into account. This revision of the production function is crucial for explaining why and how the chiefdom transforms into an early state. If under the condition of the production function being the same and therefore the war-booty also the same, the period during which the agricultural community is ruled,T, is short, the discount factor,σ, is small and/or the cost to rule,G, is large, then, the pasturage-chiefdom's chieftain has few incentives for a change in means of acquisition from the one by plunder to the acquisition by rule. In what follows, the production function of the agricultural community and the war booty gained by the pasturage conquer are revised so as to take into account the effects of the bronze-led innovations on the production process of the agricultural community after subjugated.

The revised production function of grains, denoted by f_{AR}, and the revised war booty gained by the early king, denoted by B^{ER}, are defined by Eq.(5-1) and (5-2) respectively.

(5-1) $f_{AR} = f_{AR}(m,z),\ \partial f_{AR}/\partial q > 0,\ and\ \partial^2 f_{AR}/\partial q^2 < 0,\ q \in (m,z).$

(5-2) $B^{ER} \equiv B^{ER}(m,z:T,\sigma) = \frac{1-\sigma^T}{1-\sigma}\{(1-mc)f_{AR}(m,z) - K(\gamma_B) - G(z)\},$

$\text{s.t.}, G' > 0, G'' > 0, and\ K(\gamma_B) < K(\gamma_S).$

In Eq.(5-2), the revised cost to rule, denoted by $G(z)$, reflects an increase in the cost of the economic management added by applying the bronze-led innovations to the subjugated agricultural community. On the other hand, the revised war booty can be increased by way of the positive effects of the bronze-led innovations on both the agricultural production and the

maintenance of irrigation system, in spite of the increase in the cost to rule.

5.2 The Rational Basis of the Early State

The early king determines the optimal level of the military power so as to maximize his payoff function. The revised payoff function of the early king is defined by Eq.(5-3) which is derived from Eq.(4-19) by replacing B^E with B^{ER}.

(5-3) $\pi_0^E(n,z:\mu) = \alpha f(n,z) - P_z z + (\beta + B^{ER}) - (D+\beta)/\lambda(n,z:\mu)$, and
$\lambda(n,z:\mu) = (zn)^\mu/\{(zn)^\mu + \theta(z)\}$.

From the necessary condition of maximization subjected to the constraint that $z > 1$, Eq. (5-4) and its rearranged form Eq.(5-4)' are derived.

(5-4) $\partial\pi_0^{ER}/\partial z = \alpha\,\partial f/\partial z - P_z + \partial B^{ER}/\partial z - (D+\beta)\,\partial(\lambda^{-1})/\partial z = 0.$

(5-4)' $P_z = \alpha\,\partial f/\partial z + \frac{1-\sigma^T}{1-\sigma}\{(1-mc)\,\partial f_{AR}/\partial z - G'(z)\} - (D+\beta)\,\partial\lambda^{-1}/\partial z.$

Comparing Eq.(5-4)' with Eq.(4-20), it turns out that the second term on the right side of (5-4)' is added to that of the latter. Therefore, if it is positive (negative), the sum of the first term and the third term on the right side of (5-4)' must be smaller (larger) than the sum of the two terms on the right side of (4-20). This requires an "increase in z" in order to decrease (increase) $\partial f/\partial z$ and/or decrease (increase) the absolute value of $\{\partial(\lambda^{-1})/\partial z\}$. These inferences turn out true, if we note the assumptions on the production function "f" and the signs of the first and second derivatives of λ^{-1}, given below.

$\partial(\lambda^{-1})/\partial z = \theta'(z)/(zn)^\mu - \mu n\theta(z)/(zn)^{\mu+1} < 0,\ s.t., \theta' < 0$, and
$\partial^2(\lambda^{-1})/\partial^2 z\} = \theta''(z)/(zn)^\mu - \mu(\mu+1)n^2\theta^2(z)/(zn)^{\mu+2} > 0,$
$s.t.,\ \theta''(z) > 0,\ \theta''(z) \approx \infty\ for\ z > z^*.$

In the above first and second derivative, the positive sign of the second derivative of λ^{-1} is based on the assumption of Eq.(4-5)" that the military technology which is as high as possible was adopted already in the chiefdom era, that is, the assumption that $\theta''(z)$ is a large positive.

Therefore, if the economic productivity of the subjugated agricultural community is increased (decreased) so high as to overwhelm (be overwhelmed by) an increase in the cost to rule,$G(z)$, then the early king is induced to increase (decrease) the optimal quantity of bronze. This implies that he is induced to adopt the bronze-led innovations on a larger (smaller) scale, and that his payoff is larger when he is an early king than when he is the pasturage-chiefdom's chief, and *vice versa*. These analytical results are summarized by the propositions on the optimal level of the military power and on the causality of the early state, summarized as Lemma 2 below.

Lemma 2: The Causality Proposition of the Early State

Under the condition that an early king engages in the governance of a subjugated territory and the productivity of its economic activities is increased so high as to exceed an increase in the cost to rule, then, he has the economic incentives for applying the bronze-led innovations to the economic management not only of the existing territory but also of the subjugated new territory on a larger scale than when he was the chiefdom's chieftain, and the process of adopting those bronze-led innovations is accompanied with the social transformation of the chiefdom into the early state and with an increase in the military power. The early state emerged from a chiefdom society as a result of such a doubled adaption to the First Bronze Revolution.

5-3 Recapitulation of the Process of Building an Early State

The existing conditions for an early state to emerge are the chiefdom society in which the bronze innovations were already applied not only to the production process but also to the military system of the chiefdom society. The strengthened military power brought about by those bronze-led innovations induced the pasturage-chiefdom's chieftain to pursue the conflict option in

bargaining in the external transaction with the agricultural tribe-community, and as a result, he is actually inclined to acquire grain stuffs by plunder but not by peaceful trade.

At the just beginning of the two-stage bargaining game, the pasturage chieftain is faced with a new way of acquisition—the acquisition by rule—distinguished from the acquisition by plunder. If he chooses to adopt the new one and avoids the plunder, he has to engage in the economic management of the conquered territory. Since, however, it is costly to manage the production process of the new territory, the economic productivity of the territory must increase so enough as to be set off against an increase in the cost to rule. Such a setting-off relation is impossible unless the bronze-led innovations applied to the production process of the subjugated territory are adopted on a larger scale so that they can bring about a sufficient increase in the economic productivity. Otherwise, the payoffs of the subjugated people must be reduced in order to set off the tax revenue against the cost to rule. Such an increase in the tax contradicts with the survival conditions of those people. In terms of political philosophy, whenever the tax must be raised in contradiction with the final purposed of the society, the legitimacy of the state's power is lost and the political system cannot maintain stability.

Finally, at the beginning of the organizing stage in the external trade with the agricultural community, the pasturage-chiefdom's chieftain has to determine whether or not he launches into organizing the members of the chiefdom society into a new cooperative economic unit. Since the "rule system" assures the chieftain of an increase in his payoff by way of the economic management of the subjugated territory after conquer, he starts up the organizing process. As a result, an early state emerges from the preceding chiefdom society and the chieftain becomes an early king. The political system under this early state can maintain stability, only if the payoffs of the pasturage members are allocated so as to meet not only the cohesive conditions formulated by the strong Nash equilibrium but also the survival conditions of the subjugated agricultural people.

6. Concluding Remarks

In this chapter, the game models were constructed by applying the "link and claim" game and the two-stage bargaining game, for the purpose of abstracting the essential characteristics of the tribal communities in the last stage of the Neolithic ages, the chiefdom and the early state. Then, those models were analyzed in order to derive some analytical results crucial for corroborating the synthetic propositions not only on the "causality of the early state" explicating why and how the early state came into being, but also on the "concept of the early state" explaining what the state is. According to the logic of analysis, the logic of corroborating a synthetic proposition by analysis is as follows: if a synthetic proposition is true, then, some analytical results are deduced from a simplified image or notion (in this chapter, a model) abstracted from the essential elements of an object relevant to the synthetic proposition and those analytical results don not contradict with the synthetic proposition. The criteria for truth judgment are "contradiction or not." If we follow the logic of analysis, it turns out that the synthetic propositions on the early state are corroborated by the analysis of the basic models, since it is confirmed that those analytical results derived from the analysis are not in contradiction with the synthetic propositions.

In the second chapter of this book, it was already shown that the logical framework of the causality and that of the concept category are applicable, *mutatis mutandis*, to the process of building other forms of the state coming on the later historical stages. It remains to corroborate the synthetic propositions on those states by analyzing a game-theoretic model abstracted from the essential factors of each type of those states.

Chapter 5
A Game Model of a Power Struggle

In this chapter, we focus on the topic of "who grubs the power in the first" or that of "who takes the initiative in building a new societal form." In terms of politics, the process of determining a ruler or leader is called a struggle for power, but the term is based on the implicit assumption that players participating in the process are given sufficient incentives to take the initiative in organizing any new societal form. However, all activities to organize a new societal form are not necessarily given sufficient incentives and therefore, all candidates for the ruler or leader are not necessarily motivated to participate in the process of a power struggle. In this chapter the power struggle is classified into two types, named an "active type" and a "passive type." Whilst in the case of the former it is fought by Machiavellian type of power-seekers, in the latter it is taken the initiative by Platonic type of political leaders. Furthermore, whilst the former is formulated by the analytical framework of the "patent race" game, the latter by the dynamic "war of attrition" game. For example, the political process of building an original type of the state is accompanied with the former type of power seekers, but in the case of building a peripheral state and in many cases of organizing the majority members of a society into a new cooperative team providing a pubic good, the latter type of leaders are accompanied with. Never the less, it is proved that the factors determining who grubs the power are the same for both types, except for those factors influencing on the utility obtainable from the public good provided by way of collective actions organized by the latter political leader.

Those topics addressed in this chapter are relevant to the characters of a political-military entrepreneur as well as a social entrepreneur, but they have not been taken up as an academic subject such that they are formulated for analysis.[80]

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[80] An entrepreneur type of player driven by the animal spirits is implicitly assumed to exist without proving why such a type of player comes into being.

1. Introduction

A struggle for power—concretely speaking, a political-entrepreneurial race for the state's power and a social-entrepreneurial race for the initiative in providing public goods—can be classified into an active type and a passive one. it may be considered to consist of the former type only. The former represents a power struggle determining "who grabs the power" on the implicit assumption that net-benefits obtainable from a monopoly in the power are sure to be sufficiently large. On the other hand, the latter represents the political process of determining "who takes the first initiative in organizing collective actions subjected to the condition that the efforts of organizing collective actions are exposed to free-riding motives, that is, that net-benefits obtainable from a follower's position is larger than those gained by a leader's position. Whilst the former type is observed in the process of building an original state in each historical era and in the process of a political race for elections, the latter is not only in the process of forming a periphery or secondary state—the state which emerges as a result of adapting to serious external threats from some original states and in the process of forming a new societal organization aiming to provide for a public good.

In the process of building the original state, there exists the prospect that large net-benefits are obtained by having a monopoly in the power. Power-seekers of this type may be called a Machiavellian type of power-seekers. On the other hand, in the case of the periphery state, net-benefits obtainable from political leadership may well be smaller than those of a political follower, since it is too costly for an ordinary person but not an extraordinarily heroic man to stand up first for the purpose of building a state or to take the initiative in independence and/or resistance. However, someone has to stand up for survival in the end. A reluctant power-seeker of

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It is regrettable to say that the study of entrepreneur has not yet refined the concept defined by Schumpeter (1947) according to which the entrepreneur is recognized to respond creatively to new historical or social environments and the "creative response" or the "creative change" is brought about by the introduction of a new good and/or new organization (Schumpeter, 1934).

this type may be called a Platonic type of statesman. This latter type of leader is observed in, therefore applicable to, the process of determining a candidate for the leader taking the initiative in organizing collective actions aimed at provision of a public good.

Those two types of the processes of determining "who takes the initiative in forming a new societal organization" have been ubiquitous not only in the real political world but also in many social-business arenas. Though they may be considered to be different phenomena, it turns out to be two phenomena of one original factor if we take it into consideration that an *ex ante* stage— hereafter, it is called the "organizing stage" and all efforts to clear the organizing stage is named the "organizing work" *en masse*— must be necessarily cleared before having a leadership position. Then, the above two types of a power struggle are addressed in a consistent way. Here I note not only that the organizing work is indispensable for getting over the organizing process but also that it is often too costly for an ordinary person to take on it. Then, "how to clear the organizing stage" turn out to be crucial for classifying a struggle for power into an active type and a passive one, and furthermore, the former type turns out to be represented with a race-game model and the latter with a weighting-game model. Whist the former game-model is an application of the "patent race" game (Harris and Vickers, 1985), the latter is the one of the "dynamic war of attrition" game (Hendricks and Wilson, 1985).

In this chapter, it is derived from the analyses of those two models that even though power-seekers or leaders are of a different type, the main factors crucial for determining "who becomes a person in power" and "who stands up in the first to take the initiatives in organizing collective actions" are the same, except for those factors influencing a net-benefit utility obtainable from a public good. Those common factors consist of the following three: (i) time-discount factor, (ii) talents and skills for the organizing work at the organizing stage and the managing work in the stages of providing the public good and (iii) functional form of net-benefits obtained at each providing stage.

In what follows this chapter is organized as follows: In the second section the base model of the first type is presented. In the third section this first base model is analyzed to deduce relevant results. In the fourth section the base

model of the second type is presented. In the fifth section the same analytical results are derived as the first one. In the last section the analytical results are summarized and some concluding remarks are made on implications derived from those analytical results.

2. The Base Model of an Active Power-Struggle: Machiavellian Power-Seeker

In this section, the organizing processes of an active power-struggling race are formulated by applying the patent-race game to description of those organizing processes. The work effort to be made in those processes is named the "organizing work" which is considered to be classified into the following three types of cost: the "advance cost," the "fund-raising cost" and the "bargaining cost." In the first subsection of this section, the organizing work is defined and formulated to represent the definition. In the second subsection, the process of a power struggle is formulated by a race game. Finally, it is proved that the winner of the power- struggling race is determined as a result of the sub-game perfect equilibrium of the race game.

2.1 The Basic Assumptions on the Organizing Work

First of all, the organizing processes and the organizing work must be defined and formulated. Though it is costly to take on the organizing work and, in reality, too costly to ignore it, it is observed that not a few people dare to launce into a political enterprise to clear the organizing stage. This is because they—venturous political entrepreneurs—expect to gain sufficiently large returns from such a costly or risky enterprise. The active power struggle is defined as the political race in which at least two power-seekers meet the "benefit and cost" condition for them to be induced to launch into a political race and vie to win the leadership position. In this chapter, it is assumed that two candidate-players compete for the leadership position and the competing process is formulated by a race game defined later in the second subsection.

Secondly, we have to take it into consideration that in the actual political

races which determine who takes the leadership position, "which types of candidate-players become the winner" is quite often known far before the race-game taking the form of election or that of inner war gets to the final stage. This is because the main effort-cost factors consisting of the organizing work are usually common information shared by participants in the political race. Those factors are represented by the three types of effort-cost as follows: (1) the cost spent before launching into a political enterprise, named the "advance cost" *en masse,* which is comprised of the cost to create new ideas or new policies, (2) the cost of fund-rising to organize and maintain a political machine or an advance guard—in general, the cost to form human networks with a core machine-group, and (3) the cost of winning over as many society members as possible to the political majority. This third cost, named the "cost of the bargaining work," is comprised of the cost to win as many supporters or allied members as possible over to one of the competing candidate-players. Though the process of winning the majority takes the form of election campaigns or that of military operations depending on historical background, "to win the majority" means that the winner has the power to enforce.

The advance ideas or new policies and the raised fund have generally positive effects on the performance of the bargaining work. Those effects are taken into allowance by the following two assumptions: the first is that the influences of the advance ideas or new policies are represented by the cost spent in advance with the aim of creating those ideas and policies and the second is that those of the fund-raising are represented by the amount of the fund raised in advance with the aim of forming a core-group. Therefore, the cost of winning over the majority may well be assumed to be a decreasing function of both the advance cost and the amount of the raised fund.

In this chapter, it is assumed that though both the advance cost and the fund-raising cost are given at the beginning of the first stage in the organizing process, the cost of bargaining-work is determined by the work-effort of bargaining which each candidate-player makes in each stage. More concretely speaking, the total work-effort of bargaining is measured by summing up all of the bargaining work made in those stages at the last of which the majority members must be wan over to one of two competing candidate-players. It

means that after the stage in which the majority is organized somehow, any addition to the bargaining work is not required. Therefore, a difference in the work-effort of bargaining, i.e., a difference in the bargaining cost, is determined not only by a difference in the competency for the bargaining work but also by a difference in the advance cost and the fund-raising cost.

Based on those assumptions made in the previous paragraphs, the organizing work is formulated by (a) to (d), as follows below.

(a) The majority number that must be wan over to a victor side is denoted by n and the number of the stages at the last of which the majority is wan by j candidate are denoted by Δ_j. This is assumed to be determined by both n and the following two influential factors denoted by F *en masse*: The first is the work-effort of bargaining which is made in the process of winning over the majority,. It is denoted by $\omega_j^h, h = 1,2, \dots, \exists\Delta_j$, where ω_j^h means the work-effort of bargaining made by j candidate-player in the h stage and is defined definitely in the assumption (b) below. The second is competency for the bargaining work, measured by a function through which the effort-cost ω_j^h is transformed into the number size wan over by j player, explicitly defined by the assumption (d). Then, Δ_j −the number size of those stages at the last of which the majority number is wan over− is defined by $\Delta_j = \Delta_j(n; F)$, $j = 1,2$. It is replaced with a reduced form, $\Delta_j(n)$, if analytical results gained by taking the positive effects of F into consideration are more robust than those by dismissing those effects. Furthermore, in accordance with the "as usual" assumption on the cost and the benefit, it is assumed that $\Delta_j'(n) > 0$, and $\Delta_j''(n) > 0$, $j = 1, 2$, and that $\partial\Delta_j/\partial F < 0$, and $\partial^2\Delta_j/\partial F^2 > 0$, $j = 1, 2$.

(b) Denote by ω_j^t the work-effort of bargaining which j candidate-player, $j = 1, 2$, makes in the stage-t. Then, the larger ω_j^t the j player makes, the more members he can win over. However, the maximum work-effort of bargaining he can make in each stage is subjected to the constraint that the "benefit minus cost" is nonnegative in each stage.

(c) The advance cost is fixed at the beginning of the first stage and is assumed to be a given parameter, denoted by k_j, $j = 1, 2$. Furthermore, it is assumed that the fund for election campaign or military operation, denoted by

Z, is raised also at the beginning of the first stage and is fixed. The cost of raising the funds is defined by $c_j(Z), c_j' > 0, c_j'' > 0,\ j = 1, 2.$

(d) The assumption that the advance cost and the raised fund have a positive effect on the performance of the bargaining work is formulated as follows: Denote by $W_j(\omega_j^t; k_j, Z)$ the number size which the j candidate-player can win over by making the bargaining work-effort, ω_j^t, in the stage t under the condition that the advance cost, k_j, is spent and the funds, Z, is prepared at the beginning of the first stage of the bargaining process. Then, the effects of the bargaining work-effort, of the advance cost and the fund-raising are formulated by (A1).

(A1) $W_j(0) = 0,\ \partial W_j/\partial \omega_j^t > 0,$
$\partial^2 W_j/\partial(\omega_j^t)^2 < 0;\ \partial W_j/\partial k_j > 0;\ \partial W_j/\partial Z > 0,\ \ j = 1,2.$

Thirdly, it should be noted that the winning-over processes cannot be kept secret and the information on them is usually out on the way to the final stage. Therefore, the end-result of the political race is known to all candidate-players at some stage before the end of the bargaining process. Since the structure of game characterized with complete information is suitable to describing such a leakage of information, both the race-game set up in this section and the weighting game constructed in the fifth section are assumed as a complete information game.

Fourthly, each candidate-player has a time-preference and it is represented by a discount factor, denoted by $\lambda_j,\ j = 1, 2,$ which is assumed to be given. Denote by $C_j\big(t;\ \Delta_j(n)\big)$ the total work-efforts made in the organizing stage, i.e., the organizing cost, for short. Then, at the first stage of the organizing process the j player expects to bear it if he starts bargaining at the stage, t, and ends the bargaining work at the stage, $t + \Delta_j(n)$. Then, it is defined by Eq.(2-1), under the condition that it is discounted at the beginning of the first stage.

(2-1) $C_j\left(t;\ \Delta_j(n)\right) = \{k_j + c_j(Z)\}\lambda_j^{t-1} + \sum_{h=t}^{t+\Delta_j(n)} \lambda_j^{h-1}\ \omega_j^h,\ j = 1, 2.$

Fifthly, the payoff functions of the two candidate-players have to be defined in accordance with the role of which each player takes in the organizing process. Let's denote by U_j^L $\left(U_j^F\right)$, $j = 1, 2,$ the net-benefits which j candidate-player can obtain just after he wins over the majority, by his taking the leadership position to clear the organizing process (after he belongs to a follower or subjugated side) until the final stage denoted by T. Furthermore, denote by Π_j^L $\left(\Pi_j^F\right)$, $j = 1, 2,$ the total net-payoffs which if, under the condition that j candidate-player begins the organizing process in the t stage, he is in the leadership position—he grubs the power— (if he is in the position of a follower or a subjugator after withdrawing from the power-struggling race in the stage $(t + \Delta_{-j}(n))$ in which it turns out certain that the rival player, denoted by $-j$, wins), the j candidate-player can gain by participating in the power- struggling race. Then, the j player's payoff function, if the organizing process is begun in the t stage, is defined by Eq. (2-2) and (2-3).

(2-2) $\Pi_j^L = \Pi_j^L(t) = \sum_{h=t+\Delta_j(n)+1}^{T} U_j^L \ \lambda_j^{h-1} - \ C_j\left(t;\ \Delta_j(n)\right)$, and

(2-3) $\Pi_j^F = \Pi_j^F(t) = \sum_{h=t+\Delta_{-j}(n)+1}^{T} U_j^F \ \lambda_j^{h-1} - C_j\ (t;\ \Delta_{-j}(n)),\ j = 1, 2.$

2.2 The Race Game of a Power-Struggle

In this subsection, the process of an active power-struggle, i.e., the process of winning over the majority, is formulated by the race game defined below.

Firstly, it is assumed that two players, denoted by $j = 1, 2,$ have incentives for *ex ante* taking on the organizing work indispensable for grabbing the power, and therefore, that they compete with each other for the position of leadership. As defined in the previous subsection, the organizing work is comprised of the following three factors: the creation of new ideas or plans, the raising of funds to maintain the advance-guard group and the bargaining to win over the majority members. Each factor is accompanied with the cost to

carry out its roles—the advance cost, the fund-raising cost and the work-effort of bargaining (the bargaining cost)—, in turn. Though all of these three factors are indispensable for clearing the organizing stage, above all the third one serves the most conspicuous role to finalize the organizing stage. In the bargaining process, each candidate-player is required to win over at least n members to his side as the precondition for grubbing the enforcing power. That is, the candidate-player who wins over the n members to his side faster than another one can grab the power and is not required to continue to do the bargaining work just after the stage in which he could win over those n members.

Secondly, incentives for determining at the beginning of the first stage to participate in the power-struggling race in a stage t are formulated by the following relations: Eq. (2-4) and (2-4)'.

(2-4) $\Pi_j^L(t) = \sum_{h=t+\Delta_j(n)+1}^{T} U_j^L \ \lambda_j^{h-1} - C_j\left(t;\ \Delta_j(n)\right) \geq 0,$ and

(2-4)' $\Pi_j^L(t) \geq \Pi_j^F(t) = \sum_{h=t+\Delta_{-j}(n)+1}^{T} U_j^F \ \lambda_j^{h-1} - C_j\left(t;\Delta_{-j}\right),\ j = 1, 2.$

The incentive condition (2-4) implies that T is large relatively to $\Delta_j(n)$, and that an increase in the discount factor, λ_j, has non-ignorable effects on the payoff, Π_j^L, under the condition of U_j^L being given.

Thirdly, each player wants to clear the bargaining process as soon as possible. In other word, each wants to shorten the number of stages defined by $\Delta_j(n)$ through which the n members are wan over to his side. However, the bargaining work is costly and the bargaining process must be cleared, subjected to the constraint that the "benefit minus cost" in each stage must be nonnegative.

Fourthly, if we take it into account that thanks to both the advance cost denoted by k_j and the raised funds denoted by Z, both of whose cost he had to spend as the preconditions for participating in the power-struggling race at the beginning of the first stage, each candidate-player has his own advance-guard group to his side, it turns out to be obvious that the threshold number size over which each player has to win in order to gain the majority n

is sure to be smaller than n. Therefore, it may well be assumed that the more each candidate-player spends on those two costs, the larger size of the advance guards he can maintain. Denoting those threshold maximum sizes by n_j^0, the relation between n_j^0 and the core-member size are defined as follows: $n_j^0 = n_j^0(k_j,\ Z),\ \partial n_j^0/\partial k_j < 0,\ \partial n_j^0/\partial Z > 0,\ j = 1, 2$. The negative signs of the first derivatives are derived from the assumption about the relation between the two *ex ante* costs and the core-member size.

Fifthly, on the assumption that with given k_j and Z, $W_j(w_j^t\ ; k_j\ , Z)$ is an concave function of ω_j^t and is defined as the number size which can be wan over by the j player's spending ω_j^t in the t stage for $j = 1, 2$, the process of winning over the majority is formulated in accordance with the procedures as following, below:[81]

The first step of the bargaining process is started by the candidate-player *1* and he spends ω_1^1 on the bargaining work to win over supporting members in the first stage. In the second stage, after observing the results of the first stage, the candidate-player *2* begins the bargaining process and spends ω_2^2 for the same purpose as the first candidate-player. As a result of their bargaining work, the first candidate-player can win over $W_1(\omega_1^1)$ members to his side in the first stage. On the other hand, the second candidate-player can win over $W_2(\omega_2^2)$ members to his side. From the third stage on, the bargaining processes are going on along the same procedure as the above two stages. Denote by n_j^t the number size of the members who remains to be wan over by the j candidate-player at the end of the t stage after he has spent ω_j^t and could win over $W_j(\omega_j^t)$ members in the t stage. Then, if the stage is an odd number, the processes of winning over the majority are defined by Eq.(2-5) and (2-5)'. On the other hand, if the stage number is even, they are defined by (2-6) and (2-6).'

If h is odd numbers,

(2-5) $n_1^{2h-1} = n_1^{2h-2} - W_j(\omega_j^h)$, and

[81] As to the procedure in what follows, see Harris and Vickers (1985).

(2-5)' $n_2^{2h-1} = n_2^{2h-2}$, for $h = 1,3,5, \ldots$, the maximum odd number $\leq$ T.

If h is even numbers,

(2-6) $n_1^{2h-1} = n_1^{2h-2}$, and

(2-6)' $n_2^{2h-1} = n_2^{2h-2} - W_j\left(\omega_j^h\right)$, for $h = 2, 4, 6, \ldots$, the maximum even number $\leq$ T.

Finally, the total net-payoff of each candidate-player is defined by (2-7) and (2-8) depending on whether they have the position of leadership or the one of a follower as a result of the race game. I denote by $\Pi_j^L(t)$ the net-payoff which if the j player for $j = 1$ starts the bargaining process in an odd t stage and wins over the majority member faster than his rival candidate-player in the $(t + \Delta_j(n))$ stage with $(t + \Delta_j(n))$ being odd, then he can gain. On the other hand, $\Pi_j^F(t)$ is the net-payoff which if for $j = 2$, the player 2 starts the bargaining process in an even t stage and turns out to be lost by his rival in the $(t + \Delta_{-j}(n))$ stage with $(t + \Delta_{-j}(n))$ being odd, then he gains as a result. I note that those definitions of the payoff functions are the specification of Eq.(2-2) and that of Eq.(2-3), respectively.

(2-7)

$$\Pi_j^L(t) = \sum_{h=t+\Delta_1(n)+1}^{T} U_j^L \ \lambda_j^{h-1} - \lambda_j^{t-1}\left[k_j + c_j(Z) + \sum_{h=1}^{\Delta_1(n)} \lambda_j^{2h-2}\, \omega_j^{2h-1}\right], \quad \text{for } j = 1.$$

(2-8) $$\Pi_j^F(t) = \sum_{h=t+\Delta_1(n)+1}^{T} U_j^F \ \lambda_j^{h-1} - \lambda_j^{t-1}\left[k_j + c_j(Z) + \sum_{h=1}^{\Delta_1-1} \lambda_j^{2h-1}\, \omega_j^{2h}\right],$$

for $j = 2$.

Likewise, if the j player for $j = 1$ turns out lost in an even $(t + \Delta_2(n))$ stage after he starts the bargaining process in the odd t stage, his payoff denoted by $\Pi_j^F(t)$ for $j = 1$ is defined by (2-7)'. On the other hand, if the j player for $j = 2$ wins over in an even $(t + \Delta_j(n))$ stage after his rival payer starts the bargaining process in the odd t stage, his payoff denoted by $\Pi_j^L(t)$ for $j = 2$ is defined by (2-8)'.

(2-7)' $\Pi_j^F(t) = \sum_{h=t+\Delta_2(n)+1}^{T} U_j^F \ \lambda_j^{h-1} - \lambda_j^{t-1}\left[k_j + c_j(Z) + \sum_{h=1}^{\Delta_2} \lambda_j^{2h-2}\, \omega_j^{2h-1}\right]$,

$j = 1.$

(2-8)' $\Pi_j^L(t) = \sum_{h=t+\Delta_2(n)+1}^{T} U_j^L \ \lambda_j^{h-1} - \lambda_j^{t-1}\left[\, k_j + c_j(Z) + \sum_{h=1}^{\Delta_2(n)} \lambda_j^{2h-1}\, \omega_j^{2h}\right],$

$j = 2.$

2.3 The Unique Sub-Game Perfect Equilibrium

In this subsection, it is proved along the mathematical procedure taken by Harris and Vickers (1985) that there exists the unique sub-game perfect equilibrium of the race game set up in the previous subsection. In order to apply their mathematical procedure, a mathematical architecture is set up and defined below:

First of all, a set of consecutive numbers, $\left(D_j^0,\ D_j^1, \ldots, D_j^m\right)$, is defined as follows: $D_j^0 = 0$ for $m = 0$. For $m \geq 1$, D_j^m is the maximizing D_j, such that the following incentives are satisfied:

$w_j^h \geq 0,\ (1 \leq h \leq m < T),\ w_j^{h=even} = 0$ for $j = 1,$ and $w_j^{h=odd} = 0$ for j = 2.

$\sum_{h=1}^{m} W_j(w_j^h) \geq D_j.$

$W_j\left(w_j^1\right) \geq D_j - D_j^{m-1},$ for $j = 1,$ and $W_j\left(w_j^2\right) \geq D_j - D_j^{m-1},$ for $j = 2.$

$\sum_{h=m+1}^{T} \lambda_j^{h-1} U_j^L - k_j - c_j(Z) - \sum_{h=1}^{m} \lambda_j^{h-1} w_j^h \geq 0,\ for\ \ j = 1,\ 2.$

Then, Theorem 1 can be derived by following the mathematical procedure of Harris and Vickers (1985) for proving the unique existence of the sub-game perfect equilibrium of the race game. The proof of the theorem is omitted, since it is an application of the above paper in the sense that the race game of this chapter is a simplified version of their model in the sense that it assumes any zone to be comprised of one stage whilst Harris and Vickers (1985) assumes it to consist of more than one stages.

Theorem 1: The Necessary and Sufficient Conditions of the Perfect Equilibrium

If the sub-game perfect equilibrium of the race game exists, it belongs to one of the four zones defined by (1) to (4) below, and the adverse is also true. That is, if a strategy profile of the race game belongs to one of those four zones, it is the sub-game perfect equilibrium of the race game. Those four zones are as follows below.

(1) The player 1's safety zone: for some $m \geq 1$, $D_1^m \geq n_1^0$ and $D_2^m < n_2^0$, where the player 1 wins and his effort-cost is the one he would make in the absence of the player 2. On the other hand, he player 2 gives up spending on the bargaining.

(2) The player 2's safety zone: for some $m \geq 1$, $D_1^m < n_1^0$ and $D_2^m \geq n_2^0$, where the player 2 wins and his effort-cost is the one he would make in the absence of the player 1. On the other hand, he player 1 gives up spending on the bargaining.

(3) The trigger zone: for some $m \geq 0$, $D_1^m < n_1^0 \leq D_1^{m+1}$ and $D_2^m < n_2^0 \leq D_2^{m+1}$, where if it is the player 1's turn (the player 2's turn) to spend the effort-cost of winning-over, the player 1 (the player 2) wins. The effort-cost of the player 1 (the player 2) is the one he would spend on the winning-over, if, in the absence of his rival player, he could move to the stage where he can win over the majority member denoted by n_1^0 (n_2^0) by his spending the effort-cost in this stage. The player 2 (the player 1) does not spend any effort-cost.

(4) Non-incentive zones: for any $m \geq 0$, $n_1^0 > D_1^m$ and $n_2^0 > D_2^m$, where any player does not win and spends no effort-cost of winning over.

The converse is obvious, that is, the existence of those zones is *sufficient* for the existence of the sub-game perfect equilibrium. If the fourth zone is omitted, the sub-game perfect equilibrium belongs to one of the first three zones.

Finally, the *uniqueness* is assured by the convexity of the function $W_j(\omega_j^t)$, since the maximizing D_j is the unique solution determined by maximizing

the concave function.

Furthermore, Theorem 2 is derived, the proof of which follows Harris and Vickers (1985).

Theorem 2: D_j^m is strictly increasing in both U_j^L and λ_j for $\forall\, m \geq 1$.

Proof: Firstly, it is proved that D_j^m is strictly increasing in U_j^L for $\forall\, m \geq 1$. It is trivial that D_j^0 is not decreasing in U_j^L. For the assumption of the mathematical induction, suppose D_j^{h-1} is non-decreasing in U_j^L for $h \geq 1$. Since $W_j(w_j^{h-1})$ is strictly increasing in w_j^{h-1} and D_j^{h-1} is non-decreasing in U_j^L, it turns out that the maximizing D_j^h is strictly increasing in U_j^L subjected to the constraint that the incentives condition defined by (2-4) is satisfied. By induction it is derived that D_j^m is strictly increasing in U_j^L for $\forall\, m \geq 1$.

Secondly, it is proved that D_j^m is strictly increasing in λ_j for $\forall\, m \geq 1$. On the assumption that the incentives condition (2-4) is satisfied and from the implication that T is sufficiently large relative to $\Delta_j(n)$, it is obvious that an increase in λ_j has the same effects on D_j^m as an increase in U_j^L.

From Theorem 1, Theorem 2 and their basic assumptions, some analytical propositions are deduced and they are summarized as the First Proposition given below.

The First Proposition: Five Factors Determining Who to Grab the Power

The player who can meet more sufficiently the conditions (1) to (5) is more likely to win the power-struggling race. Those five conditions are given below.

(1) The benefit U_j^L gained by grabbing the power is larger.
(2) The skills for fund-raising are more efficient. In other word, $c_j(Z)$ with a given Z, is smaller.
(3) The skills for bargaining are more efficient, or W_j is larger for a given ω_j^t.

(4) The number size, n_j^0, which must be wan over is smaller. Since it is a decreasing function of the advance cost k_j and the raised fund Z, it is determined by the talents for creating new ideas and plans and by skills to raise funds to finance the cost of setting up and maintaining a "van guard" organization such as a political core-group or military bodyguards.

(5) The discount factor is larger under the condition that U_j is large enough to the cost factors and that T are large enough relatively to the number of the stages to be cleared by the end of the bargaining process.

3. The Logic of Collective Action, Reconsidered 1

It is popular that the epoch-making power struggles in human history are full of an active or competitive type defined in the previous section. This is because power-struggling competitors in each era had the prospect of a big payoff gained by having a monopoly in the power. More strictly speaking, the political processes of building an "original state" corresponding to each historical age are characterized with such a competitive power-struggle. The original state comes into being as a result of adapting to revolutionary technological innovations not only by adopting a new military system but also by developing a new economic system which embodies those technological innovations. Therefore, the payoff which is gained by a monopoly in the enforcing power is so large as to drive political-military entrepreneurs to launch onto a political venture in spite of its being risky and costly. Therefore, collective actions required for realizing common interests or providing some basic public goods such as a guarantee of security can be organized by the political-military entrepreneurs above mentioned who are motived to do by the selfish motives. That is, those organizers of collective actions are not required to resort to emotional affections such as patriotism and fraternity, though the active type of a power-struggle cannot be applied to the process of building a peripheral state which is taken up and explained in the next section.

It is believed that the classical work of Olson (1971) named the "Logic of Collective Action" has solved the free-rider problem relevant to those collective

actions by appeal to selfish motives but not by appeal to emotional affections or altruistic motives. Those selfish motives are booted up by the "selective incentives." When the rational logic of collective action is applied to the process of a state-building, it is called the "rational bandits" theory of the state.[82] The selective incentives for those bandits are loots or booties. According to the "rational bandits" theory, a group of bandits begin with organizing themselves into a military power and roving over to loot war booties, but end with settled bandits aiming at exacting war booties at regular periods but not a capricious one-off plunder. Such a change in the way of exploiting the defeated people is induced to be brought about on the basis of the benefit-cost calculus, according to which the net-payoff gained by the settling bandits are larger than those by the roving ones in a long-run. The former bandits are motivated to protect the subjugated people from any external threat for the sake of securing a monopoly in exploiting the booties, even if they have to bear the cost to maintain the armed force at their expense. Such an exploiting system adopted by the rational "stationary bandits" is the origin of the state. This is the logic of the "rational bandits" theory on the state, rewritten from the view point of the evolutionary theory of the state. It is obvious that the Olson's logic on the state is the same as the "selective incentives" theory on the public good.

Here, I dare to say that the bandits are a bandit whether they are settled to any territory or not. That is, even if they built a long-run exploiting system based on the rational "benefit-cost" calculus, such an exploiting system is not necessarily called a state, just as a subjugation relation between many Chinese dynasties and the nomad states in the north region—the first familiar historical example is the early Han dynasty and the Xiongnu nomad state—is not called a state. Those subjugation relations should be called a "long-run war booty system" and is recognized as an intermediate stage between a state and a chiefdom society. It is because in order for a burglar to become the ruler of a state but not a chief of gangs, he has to fulfill the

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[82] Regarding the rational- bandits theory, see Olson (1993), McGuire and Olson (1996), and Olson (2000).

ultimate purposes of the society—in other word, he has to satisfy the legitimacy conditions. If he could achieve those purposes so sufficiently as to satisfy the survival conditions of the society members—the protection from external and internal threats, the satisfaction of the instinctive desires and the maintaining social systems—, then he could claim the legitimacy of the power of a state. A political system ruled by such a person in power is usually kept in order and the state can prove that it is one form of the society itself. Judging the "rational bandits" theory based on the criteria of the evolutionary theory, it does not necessarily meet the second and third purpose of the society. That is, it is obscure whether or not the rational bandits' chief engages in the governance of the subjugated people and in the management of economic productivity and furthermore endeavors to promote social institutions contributing to satisfaction of those social purposes.

Olson (1971) contributed to solving the theoretical problem with free-rider phenomena by finding out the "selective incentives" schemes from the perspective of a self-interested individual but not of an altruistic person. He applied this logic of self-interested collective action to the process of building a state and came up with the so-called "rational bandits" theory of the state, summarized in the above paragraphs. It seems to be right for the "rational bandits" theory to have been able to explain what the chiefdom is, or what a "longer run war-booty seeker" is. However, he did not examine seriously the concept of the state, in particular, in the Kantian categorical framework. As a result, he could not distinguish a state's ruler from a bandits' chief whether they are stationary or not.

Even if, however, the logic of collective action is not sufficient for the theorizing of the state due to a failure to distinguish a state's ruler from a stationary bandit, it could open a way to solve the free-rider's problem with collective actions for a state's building by likening a person in power to a stationary bandit. This way to solve had to be more open in order to apply to the theory of the state, since as well as Olson did not take the concept of the state into serious consideration, he focused on the active type of a struggle for power and did not examine the process of building a peripheral state. The

logic of collective action does not yet solve the free-rider problem with the political process of building a peripheral state or with a passive type of a power struggle. In order to solve these free-rider's problems based on the hypothesis of the "the selective incentives" scheme, the main groups consisting of a state must have been in advance organized by way of giving a sufficient selective incentive. This solution to the free-rider's problem is also applicable to the various types of public goods which can be provided by way of a not-for-profit firm set up and managed by a social entrepreneur. In order for a political-military entrepreneur and a social entrepreneur to organize such an advance-guard or a core group, however, they have to be prepare for funds to finance the cost of maintain an advance guard or a core group. That is, the existence of such a group in advance should not be considered to be common to the processes of building a peripheral state nor to the process of providing a public good. In the case of a peripheral-state building, the problem of funds is solved, if we take it into allowance that the existing societal organization preceding the peripheral state had been engaged in external trade and that they did not suddenly emerged without such any historical background. The "rational bandits" theory of the state overlooked such a historical background.

The process of a peripheral-state building must be described and formulated in an alternative theoretical framework called the "passive type of a power struggle," which is discussed in the succeeding sections. The process of providing a public good by way of a "not-for-profit organization" managed by social entrepreneur is also formulated by the same theoretical framework as the one of a peripheral-state building. This is taken up in the second part of this book.

4. The Base Model of a Passive Power Struggle: Platonic Leader

If it is used for the adjective of a power struggle, the term "passive" or "reluctant" may seem to be a contradiction of terms. However, since in this chapter all processes of determining who takes on the position of leadership are subsumed under the notion of a struggle for power, the passive or

reluctant type of a power-struggling process is also included in the power struggle. This passive type of a power struggle is formulated in the analytical framework of the "dynamic war of attrition" game developed and refined by Hendricks and Wilson (1985). In this section a base model abstracting the essential characteristics of the power struggle of a passive type is constructed in order to derive the conditions to determine who takes the initiative in organizing collective actions without sufficient selective incentives. The next subsections are begun with how to combine the instinct-driven utility with the emotional affections.

4.1 The Basic Assumptions on the Emotional Utility

The Emotional Utility: An "Instinct-Driven Utility cum Emotional Multiplier"

It should be noted that though the familiar jargon "utility" originates not only in the instinctive desires but also in the emotional affections since Bentham (1948) defined and Mill (1949) further refined it, those origins have not been explicitly distinguished. On the contrary, both origins have been treated as the same, as long as each of them brings about the same utility. The latter innate-system includes the former innate-system in a form of nest in a hierarchical way with the latter in a higher order and furthermore, both are connected with the "pleasure and pain" system working in a lower hierarchy of the genes' homeostasis mechanism.[83] The fear and the sympathy are those emotional mechanisms which are, in particular, relevant to the passive power-struggle. The "fear" emotion is particularly relevant to the problem of defense and security in the sense that it drives those agents affected by a fear to take an urgent protective action. On the other hand, though the "sympathy" emotion is also relevant to the defense and security, it works through a different mechanism from the fear-emotional system in the sense that a self-sacrificial behavior in contradiction with the survival of an individual organ is spontaneously taken for the sake of the survival of other individual organs, in particular, such as those nearly related by blood. Such

[83] See Damasio (2003, 1999).

an apparent self-sacrifice is a result of a contradicting relation between the conscious ego of an individual organ and the selfishness of the genes, in the sense that an individualist "organ agent" is self-conscious of its own ego and becomes self-conscious of its egoism being contradicting with some innate behavior programmed by the selfish "principal genes."[84] If "pleasure and pain" aroused by the sympathy emotion were counted in utilities or benefits, the utility function of those variables becomes an altruistic type and such an altruistic behavior is recognized as a good in the terms of economics, under the condition that those altruistic emotions can be evaluated by the same yardstick comprised of the "pleasure and pain" response. If the standard for evaluating the "pleasure and pain" response originating in a different cause from the instinctive desires is reduced to the same one for the instinctive desires, the theoretical problem with altruistic behaviors turns out to have been solved by dismissing the problem itself, that is, by introducing a new assumption on the utility or by changing the traditional assumption into a new one denying the selfishness of the utility or benefit. Taking recent empirical study in neuroscience and biology into consideration, it is not wrong to address the altruistic behaviors in social arenas on the basis of such a new assumption. Since, however, it is too easy to appeal to such a new solution, in this paper it is assumed that only the fear-emotion is counted in the utility. The fear-emotion tends to do damage to the utility aroused by the instinctive desires. Therefore, if a hypothesis proved to be right under the condition that the fear emotion is counted in the utility, the hypothesis becomes more robust if the fear-emotion is dismissed. In what follows, the mathematical procedure to count the fear-emotion in utility function is formulated on the basis of the basic five assumptions made in what follows below.

Firstly, it is assumed that without any means of protecting possessions from any external threat, the fear-emotion is driven to the maximum level. This assumption is based on the neuroscience's hypothesis that through the "pain" nerve-system combined with the fear-emotional system in hierarchically a

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[84] See Maki (1993) as to the relation between the individualist organ and the selfish genes.

lower level, the fear emotion does damage to the homeostasis.[85] The paralyzing effect of the fear-emotion on the instinctively-driven utility of those possessions is an example.

Secondly, it is assumed that the fear-emotion can be reduced to zero by providing a proper means to protect possessions from any threat. Such a proper means is called a "public good" augmentable by combining relevant production factors with the work-effort to coordinate them, and the amount is denoted by G. Therefore, it is, as a matter of course, justifiable to assume that the fear-emotion is a decreasing function of the public good. Furthermore, taking the knowledge of neuroscience into consideration, the assumption that the fear-emotion is a decreasing function of the public good can be more concretely formulated as follows: if the fear-emotion is counted in as a negative value until it can be reduced to zero, the fear-emotion is a convex function of the public good until it gets to the zero level at some amount of the public good. Furthermore, as long as the fear-emotion has been thoroughly eliminated upon reaching the zero level, it may well take the functional form of a flat axis beyond that amount of the public good.

Thirdly, it is assumed that the standard for evaluating the fear emotion can be converted to the standard for evaluation of the instinct-driven utility by taking it into consideration that as said in the first assumption, the fear-emotion does damage to the instinct-driven utility through the operation of the "pleasure and pain" mechanism with which both the emotional mechanism and the instinctive mechanism connected in a lower hierarchy of the homeostasis system.[86] Concretely speaking, the damage effect is assumed to function as a discounting multiplier, defined by $v_j(G_j)$; $v_j\,(G^0) = 1$, $for\ \exists G^0 \in G_j,\ v_j' \geq 0,\ v_j'' \geq 0,\ 0 \leq v_j \leq 1$. The suffix "$j$" means that the coordinating work indispensable for provision of the public good is taken on by the j player.

Fourthly, it is assumed for simplicity that the public good whose outputs are denoted by G_j is supplied through a production function with

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[85] See Damasio (2003,1999).

[86] Damasio, ibd.

"summation-technology cum discount-multiplier." This technology is characterized with the indispensability for the work-effort to transform or coordinate direct production factors into the public good. Denote by $g_{-j} \equiv \sum_{i \neq j}^{n} g_i$ the total sum of the direct production factors which are provided by society members except for the j player, by e the work-effort of transformation or coordination made by the j player, and by $\varphi_j(e)$, with $\varphi_j(0) = 0,\ \varphi_j' > 0,\ and\ \varphi_j'' < 0$, the multiplier to g_{-j}. Then, the production function of the public good, G_j, is defined by Eq.(5-1).

(5-1) $G_j = G_j(e, g_{-j} : \theta) = \varphi_j(e)\{g_{-j} - \theta\},\ for\ \exists j \in (0,1,2,\dots,n).$

In the above (5-1), θ is a "fixed salary" allocated to the j player taking on the work of transformation, subject to the constraint that $g_{-j} - \theta > 0$.

Fifthly, it is assumed that the instinct-driven utility, which is an increasing function of private goods is defined as a positive linear function of the private goods. This is an assumption for simplicity.

Denote by X_j (X_i) the private goods *en masse* consumed by j player (i player other than the j player) and by U_j (U_i) the "emotional affections" of j player (i player). Furthermore, let's call those emotional affections the "emotional utility." If taking the first and third assumption into consideration, then, the emotional utility is defined as the instinct-driven utility-cum-the discounting multiplier $v_j(G_j)$. Concretely speaking, the emotional utility of j player and that of i player are formulated by Eq.(5-2) and Eq.(5-2)', respectively.

(5-2) $U_j = U_j(e, g_{-j}: \theta) = v_j(G_j)\{I_j + \theta - e\},\ s.t.,\ I_j + \theta = X_j + e,$ and
(5-2)' $U_i = U_i(e, g_i + g_{-i-j}: \theta) = v_i(G_j)\{I_i - g_i\},\ s.t.,\ I_i = X_i + g_i\ ,$

In the above two equations, I_j (I_i) is the j (i) player's income and those utilities are subject to the minimum constraints as follows:$U_j(e,\ g_{-j}:\ \theta) \geq 0\ for\ \exists g_{-j}^0 \leq g_{-j}\ and\ U_j(e, g_{-j}: \theta) < 0\ for\ g_{-j} < g_{-j}^0$. Concretely speaking, $g_{-j}^0 = \theta$, since without meeting this condition G_j cannot take a positive value.

In what follows, the player j who takes on the work of transformation or coordination is called a "passive leader" and other players except him are called "members." The passive leader is the concept suitable for entrepreneurial players, such as a social entrepreneur, taking on the transforming or coordinating work upon which free-rider's' incentives inflict serious discouraging effects. The player taking the role of the passive leader is zero-numbered in a set of the players, defined by $(0,1,2,\dots,n)$.

The Constituent Game in the Processes of Supplying the Public Good

Suppose that in each stage, the private goods *en masse* are consumed by $(n+1)$ players numbered by $(0,1,2,\dots,n)$ whose possessions are protected by the security service of the public good in accordance with the third and fifth assumption made in the above paragraphs, and that whilst the j player expends e on the work-effort to transforming or coordinating the direct production factors into the public good, i player, $\forall i \neq j$, provides the direct production factors whose amount is denoted by g_i. Then, the strategy set of the i player and that of the j player are defined by Eq.(5-3) and by Eq.(5-3)', respectively.

(5-3) $S_j = \{e: 0 \leq e \leq I_j + \theta\}$
(5-3)' $S_i = \{g_i: 0 \leq g_i \leq I_i\},\ for\ i,\ j \in (0,1,2,\dots,n),\ i \neq j.$

Regarding the payoff function of the j player and that of the i player, they were already defined by Eq.(5-2) and (5-2)', respectively. Keep it in mind that both U_j and U_i are the "instinctive utility cum the emotional multiplier," and that the emotional factors—in this chapter, they are represented with fear-affections—is a decreasing function of the public good the main services of which are defense against any violence and protection from any threat.

4.2 The Static Analysis

The best response function of the j player and that of the i player for $i \neq j$ are derived from (5-2) and (5-2)', respectively, from the first necessary

conditions of the maximization. On the assumption that there exist the inner solutions, they are derived from (5-4) and (5-4)', respectively.

(5-4) $\partial U_j/\partial e = v_j'(G_j)\varphi_j'(e)\left(\sum_{i\neq j}^{n} g_i - \theta\right)\left(I_j + \theta - e\right) - v_j(G_j) = 0.$

(5-4)' $\partial U_i/\partial g_i = v_j'(G_j)\varphi_j(e)\,(I_i - g_i) - v_j(G_j) = 0,$ for $i \neq j.$

From (5-4) and (5-4)', Eq. (5-5) is derived and its solution has to satisfy both (5-4) and (5-4)' at the same time.

(5-5) $\varphi_j'(e)\left(\sum_{i\neq j}^{n} g_i - \theta\right)\left(I_j + \theta - e\right) = \varphi_j(e)\,(I_i - g_i),$ for $i, j \in (0,1,2 \ldots, n),\ i \neq j.$

Eq. (5-5) means that if the public good is evaluated in terms of the private good, an increase in the public good brought about by a marginal increase in the input of the j player's work-effort of transformation or coordination is equal to an increase in the public good brought about by a marginal increase in the direct production factors provided by any member-player except for the j player.

Furthermore, by rewriting (5-5) Eq.(5-5)' is obtained.

(5-5)' $\varphi_j'(e)\dfrac{\left(\sum_{i\neq j}^{n} g_i - \theta\right)}{\varphi_j(e)} = \dfrac{(I_i - g_i)}{(I_j + \theta - e)}.$

This equation means that at the equilibrium, the relative increasing rate of the public good brought about by a marginal increase in the transforming or coordinating work to the one brought about by a marginal increase in the direct production factors provided by the i player is equal to the relative rate of the private goods consumed by the i player to those by the passive leader. This ratio determines the rate of relative value between the transforming or coordinating work and the direct production factor at the equilibrium.

From the total differential equation of (5-5), it is proved that $dg_i/de > 0$ at the equilibrium. This positive sign of the first derivative means that an increase in the transforming or coordinating work-effort made by the passive leader promotes other members to increase the direct production factors of the public good.

Finally, the concavity conditions of the "instinctive utility-cum-emotional multiplier" functions are examined. From the second derivative of $U_j\ (e)$ and that of $U_i(g_i)$, Eq. (5-6) and (5-6)' are derived.

$$(5\text{-}6)\quad \partial^2 U_j/\partial e^2 = \left(\sum_{i\neq j}^{n} g_i - \theta\right)[v_j^{"}(G_j)(\varphi_j'(e))^2\ \left(I_j + \theta - e\right) - v_j'(G_j)\{-\varphi_j^{"}(e)\left(I_j + \theta - e\right) + 2\varphi_j'(e)]$$

$$(5\text{-}6)'\quad \partial^2 U_i/\partial {g_i}^2 = \varphi_j(e)[v_j^{"}\left(G_j\right)\varphi_j(e)(I_i - g_i) - 2v_j'\left(G_j\right)]$$

Keeping it in mind that according to the basic assumptions, $v_j^{"}\left(G_j\right)$ is positive and $\varphi_j^{"}(e)$ is negative, a sufficient condition for the second derivative of $U_j(e)$ to be negative is that $v_j^{"}\left(G_j\right)$ is sufficiently small relatively to the absolute value of $\varphi_j^{"}(e)$. On the other hand, a sufficient condition for the second derivative of $U_i(g_i)$ to be negative is that $v_j^{"}\left(G_j\right)$ is sufficiently small relative to $v_j'\left(G_j\right)$. In any case, the relative smallness of $v_j^{"}\left(G_j\right)$ is sufficient to assure the concavity of the instinctive utility-cum-the emotional multiplier. In other word, although the fear emotion can be more drastically declined by strengthening the measures of defense and protection—by increasing the public good—, the decreasing rate has to be limited in order to assume the concavity of the emotional utility functions. On the contrary, if someone denoted by j is highly endowed, for example by nature, with talents for the transforming or coordinating work to made by him, $v_j^{"}\left(G_j\right)$ may be relatively so large as to deny the concavity. The society with such a talented organizer, if any, is fortunate in providing any public good characterized with free-riding motives, but we cannot observe it is ubiquitous phenomena. In this sense, it is not unrealistic to assume the concavity of the instinctive utility-cum-the emotional multiplier.

5. The "Waiting Game" Model of a Passive Power-Struggle: Who stands up in the first to take the initiative in organizing collective actions?

In this section, it is assumed that any player is motivated to free-ride on the initiative taken by other players in organizing other players into a cooperative

network or a coordinated team before transforming or coordinating the direct production factors provided by those other players into the public good. On this assumption, the free-rider's problem with the initiative above mentioned is examined, and the problem of "who does stand up in the first to take the initiative" is solved in the analytical framework of a dynamic "war of attrition" game, called a "waiting game," in order to pay regard to the terms given by Bilodeau and Slivinski (1998, 1996) who came up with it by refining the dynamic "war of attrition" game developed by Hendricks and Wilson (1985). The base model set up in this section is a generalized version of the "weighting game" presented by those authors. The solution to the above free-rider's problem is given by the necessary and sufficient conditions by which it is inferred "what type of persons take on the initiative in the first," that is, "who stands up as a passive leader before anyone else."

Like the case of the race game played by active power-seekers, it is emphasized that before the public good is provided by way of the transforming or coordinating work-effort made by some player, he has to organize other member-players into a network without which they cannot be coordinated into cooperative actions to provide the public good in later stages, or the direct production factors provided by those member-players cannot be transformed into the public good. Such *ex ante* stages prior to the provision stages are called the "organizing stage" *en masse* and the organizing activity is called the "organizing work."

However, contrary to the case of the race game, we cannot take it for granted that such an organizing player always gets ready for the organizing work from the beginning. Even if all players acknowledge that the organizing work is indispensable for providing the public good in later stages, they are conscious that it does not pay them to take on the organizing work on their own initiative and that it is much better for other players to take the initiative in the organizing work. Such a free-rider's motive is well known in the social arena where it is hard for the public good to be provided. Until now, however, the free-rider's problem with the public good has been considered to be caused by the free-riding motives of the beneficiaries, and actually the free-rider's problem has been formulated so as to describe the process of its originating in

those motives. But it should be noted that the hardest problem with the public good is caused by the free-riding motive of the supplier side at the organizing stage. Such a free-riding motive is booted up by the costliness of the organizing work in the sense that there exists no social system to assure sufficient rewards for the organizing work. This "benefit and cost" relation discourages all players from taking the initiative in the organizing work and induces all of them to belong to the beneficiary side. It is because the organizing player suffers from the free-rider's problem why the player who takes on such an organizing work should be called the "passive leader."

None the less, it is also true that many public goods have been provided somehow by way of the organizing work in spite of its suffering from the free-rider's problem. Though Olson (1971, 1993, 2000) may seem to have solved the contradiction between the rational free-riding behavior and the actual phenomena contrary to it by appeal to the selective-incentives schemes, he dismissed the organizing process prior to the stage of providing the public good or achieving common interests and did not take the organizing work indispensable for clearing the organizing process into due consideration. In this section, the weak point in the selective-incentives is overcome and generalized by taking the organizing process and the organizing work into allowance. For this purpose, the whole process of providing the public good is put in a dynamic perspective and is examined in the analytical framework of the generalized weighting game.

5.1 The Basic Assumptions of the Waiting Game

Suppose that a public good can be provided by way of the transforming or coordinating work only after a group of the beneficiaries providing the direct production factors of the public good are in advance organized into a cooperative network or team, and that it is requisite for some player to take on the organizing work the role of which can be fulfilled sufficiently by one player. In other word, though the players are different in talents and skills for the organizing work as well as the transforming or coordinating work, any player can answer the purpose of the organizing work. Furthermore, it is

assumed that due to the costliness of the organizing work in the sense that it is faced with the so-called "hold up" problem—no guarantee of returns for the organizing work-effort, all players want other players to take on it. However, if the organizing work is postponed and therefore the public good remains to be supplied, things get much worse and end up with the most serious situation from a long-run perspective. Concretely speaking, if all players continue to procrastinate the organizing work, the more serious the situation becomes, and if the organizing work is put off until some stage, which may be prior to the last stage denoted by T, $s.t.$, $1 \leq T < \infty$, it is too late for any player to bring about positive net-benefits obtainable from the public good. In this sense, the procrastination ends up with the worst scenario. Those suppositions are more formulated more definitely by setting up the base model on the following assumptions below.

The Cost Factors of the Organizing Work

It is assumed that a society is comprised of $(n+1)$ members, denoted by $(0, 1, 2 \ldots, n)$, and that if j player takes on the organizing work, just as the case of the race game, at the beginning of the first stage in the organizing process he has to spend some work-effort not only on the creation of new ideas and plans relevant to providing for a public good but also on the raising of funds required for starting up the venturous project. The former work-effort is denoted by k_j and the latter one by $c_j(Z)$ the variable of which, Z, means the amount of those required funds. Then, in each organizing stage of the organizing process he has to negotiate with other member-players one by one in order to organize them into a cooperative group. In each organizing stage, it takes the work-effort to negotiate with a given number size of member-players and to talk them into joining in a cooperative network. This work-effort is denoted by w_j. Furthermore, it is assumed that even if any j player takes on the organizing work, it takes Δ stages to persuade all of the n members into joining in the cooperative network. Then, denoting by $C_j(t)$ the total organizing work required to persuade all member players, it is defined by Eq. (6-1), if it is begun in some t stage, subjected to the condition that $\Delta_j = \Delta,\ j \in (0, 1, \ldots, n)$.

(6-1) $C_j(t) = \{k_j + c_j(Z)\}\lambda_j^{t-1} + \sum_{h=t}^{t+\Delta_j} \lambda_j^{h-1}\ w_j,\ \exists j \in (0,1,2,\dots,n).$

It should be noted that in the above equation, the meaning of $c_j(Z)$ on the right side is different from the one used in the race game but that λ_j is the discount factor of j player as in the case of the race game.

The Payoff Functions

Denote by $\Pi_j^L(t)$ the total net-payoff which player j can gain if he begins taking on the organizing work at the t stage, $s.t., 1 \le t < T$, and by $\Pi_i^F(t)$ the total net-payoff which player i, $\forall i \neq j$, can obtain on the condition that though he does not take on the organizing work, the player j, $j \neq i$, takes it on at the t stage. Furthermore, let's denote by $\Pi_j^D(t)$ the total net-payoff which if some other player also begins the organizing work at the same time as j player does, the j player can gain. $\Pi_j^L(t)$, $\Pi_i^F(t)$ and $\Pi_j^D(t)$ are named the leader's payoff, the follower payoff and the tie payoff, in turn. Since the third case ends up with a draw in the sense that the organizing work is shared by two players, it may as well be assumed that the payoff in the tie is larger than Π_j^L. Since any player who can avoid the organizing work can enjoy the benefits of the public good without bearing the cost of the organizing work, Π_j^D is assumed to be smaller than Π_j^F. Bearing it in mind that the leader's payoff and the follower's one gained at each constituent stage in the process of supplying the public good are denoted by U_j and by U_i respective, the payoff-functions based on the above assumptions are defined by Eq.(6-2), (6-3) and (6-4), in turn.

(6-2) $\Pi_j^L(t) = -C_j(t) + \sum_{h=t+\Delta_j+1}^{T} U_j\left(e, g_{-j}:\theta\right)\lambda_j^{h-1},\ s.t.,\ \Pi_j^L(1) > 0.$

(6-3) $\Pi_i^F(t) = \sum_{h=t+\Delta_j+1}^{T} U_i\left(e, g_{-j}:\theta\right)\lambda_i^{h-1}.$

(6-4) $\Pi_j^D(t) = -\frac{1}{l}C_j(t) + \sum_{h=t+\Delta_j+1}^{T} U_j\left(e, g_{-j}:\theta\right)\lambda_j^{h-1}$, for $l > 1$.

It is obvious that not only $\Pi_j^L(t)$ but also $\Pi_j^F(t)$ and $\Pi_j^D(t)$ are a strictly-decreasing function of t, for $t \leq T - \Delta_j$. Furthermore, it is trivial to say that $\Pi_j^L(t) < 0$ and $\Pi_j^F(t) \leq 0$, for $t \geq T - \Delta$. In order to emphasize the doomsday's scenario, it may be assumed that all of those payoff functions are the smallest or the worst payoff gained in the weighting game. That is, taking up $\Pi_j^L(T)$ as an example, the absolute value of $\Pi_j^L(T)$ is the largest in all absolute values of $\Pi_j^L(t)$. This assumption is justified if we observe such a historical example that if, under a serious external threat, the process of building a peripheral-state is put off so later, it is inevitable to ruin, and such a natural environmental example that if taking the measures to stop the deterioration of natural environments continues to be procrastinated so long, those natural environments ruin in a non-recoverable way and our living conditions sure to contradict with our survival conditions.

It is easy to prove that the total payoff functions defined by (6-2) to (6-4) and other assumptions satisfy the basic assumptions of the dynamic "war of attrition" game defined by Hendricks and Wilson (1985). Those basic assumptions are rewritten in terms of the notations of this paper by (A-1), (A-2) and (A-3).

(A-1) $\Pi_j^F(t+1) \geq \Pi_j^L(t)$, for $t \geq 1,\ t+1 < T$.
(A-2) $\Pi_j^L(t) \geq \Pi_j^L(t+1)$, for $t \geq 1,\ t+1 < T$.
(A-3) $\Pi_j^F(t) \geq \Pi_j^D(t)$, for $t \geq 1,\ t < T$.

The Critical Stage

Keep it in mind that any j player who takes on the organizing work at the $(T - \Delta_j)$ stage and at the stages later than it cannot gain a positive net-payoff, and that $\Pi_j^L(t)$ is a strictly-decreasing function of t, for $t \leq T - \Delta$. Then, it turns out that some players' total net-payoff functions may take a negative value at some stage prior to the $(T - \Delta_j)$ stage. Let's call this stage where $\Pi_j^L(t)$ takes a negative value the "critical stage" of the j player and denote it by τ_j. Furthermore, let's assume that all players are ordered by the numerical number of his critical stage, and, for simplicity, that $\tau_0 \geq \tau_1 \geq \tau_2 \geq \cdots \geq \tau_n$. It is obvious that $\tau_0 < T - \Delta_0 < T$.

A difference in the critical value is influenced by a difference in the following parametric factors: the first is the talents and skills for the organizing work, approximated by w_j, k_j and $c_j(Z)$ for a given Z, the second is the time-discount factor, and the third is the factors to influencing on the constituent utility, U_j , the main parametric factors of which are the talents for the transforming or coordinating work, represented by φ_j, the protective effects of the public good, represented by v_j ,and the organizing player's salary, denoted by θ. Then, by analytical inference a proposition on the critical stage is deduced as follows, below.

Analytical Proposition 1: the Determinants of the Critical Stage

The more talented and skilful a player is for the organizing work, the higher discount factor he has, and the larger his constituent utility is, then, the larger the number of this player's critical stage is.

5.2 The Existence and Uniqueness of the Subgame Perfect Equilibrium

The base model of the weighting game set up in the previous fifth section and the above subsection has the unique strategy profile satisfying the following conditions: if the players behave in accordance with the strategy profile, only one player stands up in the first to take the initiative in organizing collective actions at the first stage of the game but other players wait and choose the follower's position. Furthermore, the strategy profile meets the necessary and sufficient conditions of the subgame perfect equilibrium. They are summarized as Theorem 3, given below.

Theorem 3

The strategy profile according to which only the zero-numbered player stands up in the first at the beginning of the first stage to take the initiative in organizing other member-players into a cooperative network—in other word, to take the initiative in solving the "collective action" problem of a large group —is the subgame perfect equilibrium of the dynamic "war of attrition" game.

Proof: This theorem is proved by applying the proof procedure taken in Theorem 6.2 of Hendricks and Wilson (1985). According to it, the proposition that the strategy profile above mentioned meets the sufficient and necessary condition of the subgame perfect equilibrium is equivalent to the proposition that the three conditions, defined by (i), (ii) and (iii) below, are met on the basic assumptions defined by (A-1), (A-2) and (A-3). Those three conditions are as follows: (i) $\Pi_0^L(1) \geq 0$, (ii) $\tau_0 \geq \tau_1 + 1$, and (iii) if $\tau_0 < T$ and $\Pi_0^L(\tau_0) < 0$, then $\tau_0 \geq \tau_1$. It is obvious that the basic assumptions of the waiting game set up in this chapter satisfy those three conditions.

Furthermore, from Theorem 3 some implications on the Platonic leadership are derived and they are summarized as the Second Proposition in what follows, below.

The Second Proposition

According to the proof procedure of the backward induction, on the condition that all players are motivated to free-ride on other players' organizing work, the player whose critical stage comes in the latest—the zero-numbered player—takes the initiative in organizing collective action and stands up in the first at the beginning in the first stage of the dynamic "war of attrition" game. The critical stage, denoted by τ_j in a generic term, is determined by way of those parametric factors which are relevant to the talents and skills for the organizing work and to the constituent utility increased by supplying the public good. Generally speaking, the more talented and skilful for the organizing work some player is, the larger discount factor he has, and/or the larger constituent utility he has, then the larger is the critical value of this player.

Concretely speaking, a difference in the critical value originates in the difference in the following parametric factors: the first is the talents and skills for the organizing work measured by a combination of w_j, k_j and $c_j(Z)$ for a given Z, the second is the time-discount factor defined by λ_j, and the third is the parametric factors influencing on the constituent utility, U_j^L —the talents for the transforming or coordinating work, represented by φ_j, the protective

effects of the public good, represented by v_j, and the coordinator's salary, denoted by θ.

The effects of the salary allocated to the passive leader on the payoff or the constituent utility are a special topic of interest. Regarding those effects, an analytical proposition is deduced and summarized as Analytical Proposition 2, given below.

Analytical Proposition 2: the Effects of the Salary on the Utility

The effects of the salary θ on constituent utility depend on the protective effects of the public good on the private possessions satisfying the instinctive utility or on the fear emotions. Those effects are approximately measured by $v_j(G_j)$ and $v_j'(G_j)$. If $v_j'(G_j)$ is sufficiently large relatively to $v_j(G_j)$, then, a parametric increase in the salary brings about a decrease in the constituent utility. This analytical proposition is confirmed by examining the first derivatives of U_j and U_i. Those first derivatives are: $\partial U_j/\partial\theta = -v_j'(G_j)\varphi_j(e)\{I_j + \theta - e\} + v_j(G_j)$, and $\partial U_i/\partial\theta = -v_j'(G_j)\varphi_j(e)\{I_i - g_i) < 0$.

The above Analytical Proposition 2 implies that if an increase in the public good—an increase in the protective measures—brings about conspicuous effects on a decrease in the fear-emotions or an increase in the security of life and private possession, the salary allocated to the passive leader should be reduced to a requirement level. This implication is confirmed by the inference that since an increase in the salary on the condition of a given G_j decreases the share of the production factors to be allocated to the provision of the public good, the decrease in the production factors allocated to the public good influence negatively on the constituent utility on the assumption that an increase in the protective measures can more secure life and possession or more reduce the fear emotions.

5.3 Platonic Statesman vs. Machiavellian Power-Seeker

In the dynamic "waiting game" determining who becomes the Platonic leader—who stands up in the first to take the initiative in organizing collective actions in the circumstance where all players are motivated to free-ride on other players' organizing work—, those parametric factors influencing the critical stage are classified into three ones as following: the first is those influencing on the talents and skills for the organizing work, the second is those influencing on the constituent utility and the third is the discount-factor.

On the other hand, in the dynamic "race game" determining who wins the Machiavellian power struggle, the winner shares the first and third factor with the Platonic leader. Regarding the second factor, however, whilst the Machiavellian power-seeker is assured of sufficiently big constituent utility, the constituent utility of the Platonic leader is dependent on his talents and skills for the transforming or coordinating work indispensable for the supply of the public good—the protective measures of securing life and private possession or of reducing the fear-emotions. For a talented and skilful candidate for a Platonic type of leader, it is too risky to leave the use of the state's power to any other candidates without such skills and talents as his. According to the dialog of Plate (1941), the escape from this risk is the greatest benefit obtainable from taking the initiative in organizing collective actions. When Plato insisted that some citizen stands up as the statesman who dares to devote himself to the affairs of the "polis" state, the reasoning seems to be based on such a rational logic in spite of its appearance of a self-sacrificing action. The ostensibly self-sacrificing action is often associated with the tendency of the statesman to reduce his salary in return for an increase in the allocation to the direct production factors of the public good. Therefore, the Platonic type of leaders may be subsumed in the categorical framework of a rational individualism, on the condition that the traditional instinct-driven utility is modified into the instinctive utility-cum-the emotional affection.

The political leaders of an advance-guard type defined by Ortega (1930,

1921) as well as "der Geist der Welt" (an epoch-making political hero) defined by Hegel (1824/25, 1807) are another example for the Platonic type of political leaders. They are common in arguing that only this type of political leader creates a new idea on the state which can adapt to future circumstances and then launches onto a political enterprise with the aim to build a new state in spite of other persons being unconscious of the necessity to build the new state or being motivated to free-ride on someone's initiatives. However, those philosophers did not take the emotional utility into account in arguing for the indispensability of a self-sacrificing leader, either.

6. Concluding Remarks

The statesman of a Platonic leader type has been recognized as an idealized image but not as a realistic existence, in particular, from the view point of the methodological individualism. Such an idealized image originates in the phenomena in which many of the statesmen appear to devote themselves to self-sacrificing behaviors. However, it is possible to found those self-sacrificing behaviors on a rational basis but not based on altruism, if the statesmen' actions are put in a dynamic perspective and the fear-emotion is evaluated in terms of the instinctive utility through conversed factors such as the discount factor. Such an assumption on the "instinct-driven utility-cum-the emotional affections" is supported by the empirical study of neuroscience.

As long as some candidates for the statesman believe that they are superior in the statesmanship to others, in particular, that when faced with serious crisis on a community scale, they excel in providing for a public good vital for the community 's survival, it can pay them to take on the apparently self-sacrificing actions. It is because on the condition that the public good provided through their organizing work contributes to protecting life and possession from external threats, the political leader of a Platonic leader type is also rewarded by a drastic increase in the validity of his life and possession or by a drastic decrease in the fear emotions. Therefore, without an appeal to the altruistic hypothesis the so-called sacrificing actions of the Platonic political leader are reconciled with the rational reasoning, as long as the

fear-emotion is combined with the instinctive utility by way of the above conversed factor and their behaviors are put in a dynamic perspective.

If the statesman who, for example, when faced with a national crisis, stands up to take the initiative in organizing collective actions should be recognized as an altruistic type of person, he has to be defined as a person who has an altruistic utility as well as a self-interested one. Such a behavior hypothesis can be corroborated by many empirical works of the modern neuroscience on emotional systems such as sympathy, honor and shame. However, many of those emotions, in particular, if they tend to encourage ethical behaviors, are of a secondary nature in the sense that they developed derivatively through combining a self-sacrificing behavior with the innately-programmed emotional systems such as an affection to close kinship, fear, sorrow, happiness and anger. That is, those secondary emotions cannot develop without the belief that a community continues to exist, because an individual is freed from obeying any ethical behavior in the anarchic condition where any ethical behavior is not assured of an honor-reward in return for it or any unethical behavior loses association with shame-emotion. Therefore, in order to base the altruistic behavior of the statesmen on the secondary emotional mechanisms, it has to be assumed that a community continues to exist and that those candidates for political leader believe that they continue to belong to the community. Such an assumption supporting the altruistic behavioral hypothesis is more realistic, if it is applied to the social entrepreneur observed in business arenas.

Part 2

Political and Social Entrepreneur: Beyond the Logic of Collective Action

Political and Social Entrepreneur: Beyond the Logic of Collective Action

In the first part of this book, it was emphasized that though the organizing work is prerequisite for any collective action, it is hard for it to be carried out as long as it is exposed to the free-rider's problem. But it was shown that whilst an active type of political-military entrepreneur solves this problem by satisfying the self-interests by way of grubbing the power, a passive type of leader does it by satisfying the instinct-driven utility-cum-the emotional affections. The traditional approach to the free-rider's problem was criticized because it is based only on the instinct-driven utility. The many empirical works of neuroscience and biology in recent years corroborate the basic hypothesis that the emotional affections are booted up by the innate genes' programs which drive an individual organ to take some action, and the one that though the emotional mechanism is distinguished from the instinctive mechanism in the sense that the former works in the higher hierarchy of homeostatic system than the latter, both are connected in a form of Russian dolls by way of the pleasure and pain mechanism working in the lower hierarchy. However, the free-rider's problems taken up in the first part are the phenomena in public political arenas.

In the second part of this book, firstly the free-rider's problem is extended to intermediate arenas between a private economic arena and a public political arena, secondly the causality of the free-rider's problem is founded on the "held-up" hypothesis of asymmetric information, and thirdly some selective-incentive schemes which can solve the held-up problem are presented, in turn.

Chapter 1
The "Incomplete Contract" Approach to the Collective Action Problem: An Application of the Property-Rights Approach to Asymmetric Information Problem

It is said that Olson (1965), by finding out the "selective-incentives" scheme, solved the following question: why a latent (large) group can be organized into a cooperative network or team in spite of its being subjected to the free-rider's problem". However, in order to carry out the selective-incentives scheme, it is required to organize a group of members into a cooperative network or team prior to the stage of providing a collective good or before the proceeds of the collective good are collected. Needless to say, someone has to undertake such an organizing work at ex santé stage before the process of supplying the collective good begins. On the other hand, it is assumed, as a matter of course, that candidates for the organizer are a self-interest seeker. Then, the following circular argument props up: why any self-interest seeker takes on the organizing work without any guarantee of a sufficient reward or compensation for it? Though Olson was conscious that the process of organizing a group of members must be cleared before providing any collective good, he did not take it up explicitly and did not examine logical relations between no guarantee of a reward for the ex ante organizing work and the motives of a self-interest seeker for it. Without proving that the organizing work required for any selective-incentive scheme is well motivated, the Olson's solution has a fault.

The same logical fault is found out in another solution the proponents of which argue that the collective action problem is solved by introducing a political entrepreneur into any collective action.[1] The political entrepreneur

[1] As to the traditional argument for the political entrepreneur, see Wagner (1965), Ostrom (1965), Salisbury (1969), Flohlich etal. (1971), Jones (1978), Guttman (1982), Blanco and Bates (1990), Calvert (1992), Kuhnert (2001), and Arce M.(2001). Ostrom (1965) and Kuhnert (2001) chose a different terminology called the "public entrepreneur," but I subsumed it under the concept of the political entrepreneur, because its essential nature is common

may be considered as a solution to the free-rider's problem with the organizing work. However, the proponents who insist that the political entrepreneur can solve the free-rider's problem also overlooked the same motivation problem as the selective-incentives scheme.

This chapter begins with the main proposition of the property-rights approach to the problem of asymmetric information, with a view to applying it to the problem of collective action in non-market arenas. It is, if applied to the collective action, reformulated as the following: that since the organizing work is of a relation-specific and non-verifiable nature, it is exposed to the held-up problem. This hypothetical proposition reduces the root cause of the free-rider's problem with the organizing work to the hold-up problem which inevitably arises together with any *ex ante* work exposed to asymmetric information. The organizing work is one of such an ex ante works exposed to asymmetric information, so that it is not guaranteed of a sufficient reward for the work-effort and therefore that it is exposed to the free-rider problem. That is, although all players acknowledge that the organizing work is indispensable for any collective action aimed at supplying a collective good in later stages, they are induced to avoid taking on the organizing work and to free-ride on someone's initiative in doing it, due to no system to guarantee a sufficient reward for the work or no system to verify the work-load of the organizing work, that is, due to no system to overcome the asymmetric-information problem.

On the other hand, we observe ubiquitously that the free-rider's problems of an above-mentioned type are actually solved. It means that the organizing process prerequisite for collective action had to be cleared somehow. How

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to the political entrepreneur and the public entrepreneur has to be also engaged not only in the organizing work but also in the managing work. They are common in assuming the existence of a political entrepreneur who takes the initiative in organizing a society's members into a collective action. By contrast, Tullock(1971) and Silver(1974) keep to the "economic approach" more coherently, in the sense that they do not take it for granted that a political entrepreneur exists.

could the free-rider's problem with the organizing work be overcome? This is the main question of this chapter.

In order to explain the root-cause of the free-rider's problem, in what follows, the property-rights approach to the problem of asymmetric information is taken up and the "incomplete-contract" approach is applied with a view to solving the above question. The main players are a political entrepreneur and a pressure group, both of whom are connected by way of sharing the net-benefits gained by participating in political rent-seeking process subjected to the condition that some non-human capitals and assets are required to bring about those bet-benefits. A three-stage game is set up to describe the process of organizing collective actions and to design an incomplete-contract scheme. It is shown that the effectiveness of the incomplete-contract scheme depends on the ownership to those non-human capitals and assets, that is, on who have the property rights to those capitals and assets, and that the political entrepreneur' ownership of non-human capitals and assets required for political activities can bring about more effective outcomes than the organized group's ownership in the sense that common interests or collective goods are achieved on a larger scale.

1. Introduction

Various costly works at ex ante stages are a prerequisite indispensable for supplying collective goods in later stages through the process of organizing a collective action. Creating innovative ideas, making strategies or plans, persuasion or negotiation other members into a cooperative team or network, and setting up new teams or organizations are examples for those ex ante works. In this book, those ex ante works required for supplying a collective good in later stages are called the *organizing work* in a lump and other works required at the stages of supplying the collective good the *managing work*, for convenience. S*omeone* has to take on the organizing work prior to the supplying stage, but if it is taken on, he incurs non-negligible cost, which is often seriously too high for a self-interested person to bear. Who on earth could undertake such an ex ante work?

In order to emphasize the innovative and risk-taking nature of the organizing work in business arena, the economic agent who dares to take on it as well as the managing work is called the "business entrepreneur" or the "for-profit entrepreneur" in economics literature. By analogy, the self-interested agent who dares to undertake it in the arena of collective action has been called the "political entrepreneur," and it has been emphasized that the political entrepreneur is a key player to solve the problem of collective action in the sense that political leadership is a prerequisite to achieve any collective interest or to provide for any collective good.[2]

However, any self-interested individual is not willing to do any costly work without some prospect of compensation or reward for it. Then, is it possible to assume that the political entrepreneur exists in any time and he is always motivated to take on the organizing work as well as the managing work? This question should be worth calling more attention, if we take it into consideration that the organizing work is usually of a relation-specific and non-verifiable nature, and therefore suffers from a "holdup problem." This problem discourages candidates for the political entrepreneur to take on the organizing work in spite of its indispensability for achieving any collective interest or providing any collective good. Even if the motives of a free rider to deviate from cooperative burden-sharing in the direct cost of providing a collective good can be overcome at a sufficiently low monitoring and punishment cost, another free-rider problem—the problem "who should take on the organizing work"—remains to be solved. It is of a public good nature, and various types of collective goods in common tend to be involved in it.

Whilst the managing work is rarely missed in any economic analysis, the organizing work has been overlooked or has not been explicitly examined, in particular, in the explanation of collective goods. In this chapter the problem of collective action is examined from the angle of those self-interested political

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[2] As to the proponets of the political entrepreneur, see Wagner (1965), Ostrom (1965), Salisbury (1969), Flohlich etal. (1971), Jones (1978), Guttman (1982), Blanco and Bates (1990), Calvert (1992), Kuhnert (2001), and Arce M.(2001), Ostrom (1965) and Kuhnert (2001), Tullock(1971) and Silver (1974).

entrepreneurs who, if a collective good should be provided, have to take on the costly organizing work as well as the managing work. For this purpose, a game-model composed of three-stage structures is set up as the analytical framework in which the whole process of providing a collective good divided into the organizing stage, the renegotiation stage, and the production stage. The whole process is viewed as a business activity of the political entrepreneur (hereafter, referred as "he").

In general, at least two conditions have to be met for an entrepreneurial agent to launch onto any business project. Those conditions are as follows: the first is that he has the prospect of sufficiently high effective demand for his work, and the second is that the receipt of rewards for his work is assured at low transaction cost. The first condition means that if he takes the initiative in providing the collective good, the beneficiaries of the collective good (hereafter, referred as "she") are ready to share the burden of the direct cost to produce the collective good. On the other hand, the second condition means that the cost of solving the incomplete-contract problem accompanied with the organizing work is sufficiently low. The possibility of renegotiation at the second stage of the three-stage game set up in this chapter plays a crucial role in solving that incomplete problem. To make this point, suppose an entrepreneur has just mobilized a sufficient size of beneficiary player at the organizing stage. If his managing work in advance is required to provide the collective good in later production stage, he has a favorable opportunity to renegotiate on compensation or reward for his organizing work just before he production process begins. On the contrary, if not, the organizing work undertaken by him is of a relation-specific and non-verifiable nature, and therefore the organizing work may not be guaranteed of a sufficient reward. This is because his tasks at the production stage—called the "managing work" in this book—can be taken over by someone else who did not bear the work load of the organizing work at the first stage. The renegotiation becomes possible, if political entrepreneurship is required not only at the organizing stage but also at the production stage. By recourse to the possibility of such a renegotiation, we can explain why the organizing work is carried out in some case but not in others. It can explain, on one hand, why even a small group of

beneficiaries are not so easily organized into a cooperative group, if some incumbent politicians or government organizations can take over the organizer's tasks at the production stage, and, on the other hand, why the organizing work required to build a new state comprised of a large group can be carried out, if the managing work of those organizers is required successively at the production stage.

According to the analysis of Che and Hausch (1999), any incomplete contract [3] dealing with cooperative investments cannot solve inefficiency problems, if the renegotiation possibility cannot be ruled out. This paper, on the contrary, shows that the possibility of renegotiation is a necessary condition to solve the inefficiency problem with the provision of a collective good. At the renegotiation stage, a default payoff must be calculated as the reference point of bargaining. Here, we have to take it into consideration that the default payoff of organizer-player (political entrepreneur) and that of the organized ones (beneficiaries) are influenced by the network structure of each group.[4] Whilst some groups such as business clubs have sufficiently large incentives to be directly or indirectly networked spontaneously—they are called the "financially-independent group," other groups such as consumers or citizens need an external initiative in networking them—they are called the "financially-dependent group." Whilst the cost of organizing the latter group is higher than the former one, the political entrepreneur who tries to organize the former one can more easily exempt from bearing the cost to finance various capitals or assets such as offices, cars, and members' list all of which are required for political races for office. The low cost to finance those capitals or assets explains why candidates for the political entrepreneur organizing the former group can be parachuted down to an already-connected group. It is because the former group can share in the use of those capitals or assets with the political entrepreneur for the purpose of achieving collective interests. On the other hand, candidates for the political entrepreneur who tries to organize

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[3] As to the details of the incomplete-contract, see Williamson (1979).

[4] As to the concept of the network structure defined in this chapter, see Myerson (1977), Jackson and Wolingsky (1996), Qin (1996), Dutt, et al.(1998)

the latter groups have to provide themselves with those capitals or assets on his own. So-called "junior politicians" exempt from bearing the cost to finance those capitals or assets, because they can inherit those capitals and assets from their immediate predecessor—father.

I describe the influence of the above-mentioned capitals or assets on the default payoffs in accordance with concepts defined by the "property right" approach. This is the hypothesis put forth and refined by Grossman and Hart (1986), Hart and Moore (1990), Hart (1995). If their hypothesis is applied to the collective action problem taken up in this chapter and is put in another way, the political entrepreneurship requires at least some non-human assets to achieve his goal of providing a collective good. Those assets may belong to the political entrepreneur or to the organized members' side. In this chapter, whilst the political entrepreneur organizing the former type of groups is called "financially independent type", the one organizing the latter type of groups are called "financially dependent type."

From the qualitative analysis of the three-stage game, I derive the following results; (i) that the possibility of collective action depends on whether or not the political entrepreneur can be well motivated to take on the organizing work as well as the providing work, but not necessarily on the group size itself, and (ii) that a collective interest can be attained on a larger scale by a financially-independent type of political entrepreneur or the political entrepreneur's ownership of those non-human assets. From these analytical results some theoretical implications are derived, which press us to reexamine the Olson's logic of collective action.

This chapter is organized as follows: In the next section, the logic of collective action is reconsidered from the perspective of this paper. In the third section the basic model of this paper set up. In the fourth section, it is shown that the analytical results are different between two types of ownership rights to the non-human capitals and assets and that those results are compared on the basis of the criteria for efficiency achieved under each of those property-right structures. In the last section, the main results are summarized, and some theoretical implications are derived.

2. The Logic of Collective Action, Reconsidered 2

If we take it into consideration that the organizing work is prerequisite for any collective action through which a collective good is supplied in later stages, the so-called "collective action" problem raised by Olson is restated as follows: although all members of a latent group are ready to bear the direct cost to supply a collective good[5], it is impossible to achieve the efficient supply level without someone's taking the initiative in organizing at least a threshold number of the group members into a cooperative network or team. In fact, the lack of the initiative arises, if anyone is induced to free-ride on the organizing work undertaken by someone.

More concretely speaking, unless a sufficient compensation or reward for the organizing work is guaranteed, no one dare to take the initiative in organizing any collective action. Therefore, in order to provide a collective good on the efficient level, at least the following two conditions must be met: the first is that each member has such a high effective demand for the collective good as to be ready to share the burden of the cost to supply it, and the second is that an organizing agent is guaranteed of a compensation or reward for the organizing work carried out in advance as well as the managing work which must be done when the collective good in later stages is supplied.

According to the main concepts of the incomplete-contract approach, the above two conditions are restated as in what follows: Even if the payoff of each group member, which is obtained from the benefit of a collective good minus a share of the cost to produce it, exceeds her status quo payoff, her talents and skills are not suitable for the organizer's role or the political entrepreneur. That is, the payoff of an organized member is larger than that obtained if she takes on the role of the organizing player, i.e., the political entrepreneur. So, she is satisfied with the status of an organized member, and

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[5] This is the same assumption as the "perfect consensus" defined by Olson. See Olson (1965), pp.59-60.

she is ready to be organized into a cooperative network or team and to share the cost to supply the collective good. On the other hand, since the political entrepreneur has to take on the organizing work, he is not necessarily satisfied only with benefits obtainable from the collective good itself and the net-benefit to him of the collective good may not be so large as to exceed his status quo payoff. If he can be satisfied enough, he is actually a "privileged member" of the group, which is in contradiction with the assumption of the latent group. In order to motivate him to take on the organizer' role, accordingly, he must be able to have the prospect that a sufficient compensation or reward for his organizing work is paid at the low transaction cost of overcoming the problem with incomplete contract.[6] Furthermore, his payoff must be larger than the payoff obtained if he is an organized member.

If the collective good in the above is replaced with the "selective incentives," the circumstance in which the "by-product theory" of Olson (1965) holds is similar to the one which the above conditions are met. He noted that the "cost of organization" is requisite (Olson, 1965: p.47), but did not take up any organizing agent in person who takes on the initiative in organizing other group members into collective action. However, the "selective incentives" can be provided only if some organizing agent (hereafter, this organizer is called a "political entrepreneur") dares to undertake the organizing and managing work to provide them, on the condition that there is a sufficiently high effective demand for the collective good. Though the "by-product" theory of collective action has been criticized for the reason of its falling into a circulation argument that it assumes the existence of the organizing agent, it could avoid such a criticism as long as it explicitly put the political entrepreneur into its analytical framework. It is sure that if a latent group

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[6] This logic implies that the concept of excludability be taken over by that of the transaction cost. Regarding this idea, see Coase (1960) and Demsetz (1964). Sandler also recognized the organizing cost as one of the transaction cost. See Sandler (1992), p.48.

has been organized on a sufficient scale thanks to the organizing work carried out by the political entrepreneur, he can avoid the cost to organize a latent group with a view to providing other collective goods such as a public good for the same group in the next later stage after the collective good works as the selective-incentives. Then, it becomes easier for him to provide those other collective goods, because he can avoid the organizing work required for those other collective goods. Such a circumstance—the existence of a selective incentive—is the organizational condition which Olson (1965) argued is indispensable for providing any collective good for a latent group.

However, it is not realistic to assume that the above-mentioned conditions for a collective good to be provided are always satisfied, or to assume the existence of a selective incentive without any artificial design, either. First of all, the participation constraint of each group member may not be satisfied, because of a low effective demand for the collective good. Secondly, the participation constraint of the political entrepreneur may not be satisfied owing to the relation-specific and non-verifiable nature of the organizing work. To organize a latent group is usually too costly to be overlooked. However, though it is of a relation-specific nature, it must be done "now" without any complete contract assuring that it is compensated or rewarded "later." On the condition of the incomplete-contract, it is not verifiable just when he makes a claim for the reward or compensation for it. Thus, he is faced with the "hold-up" problem. If he anticipates, at the beginning, that this hold-up problem is sure to arise "later," the organizing work is not carried out "now." This is the same as the situation where, in spite of the existence of the "perfect consensus" about the provision of the collective good, the political entrepreneur cannot dare to launch into the organizing work because of no guarantee of a compensation for or reward to it. In terms of the incomplete-contract approach, the problem caused by the motives to free-ride on others' organizing work is recognized as the problem caused by the insecure guarantee of the reward or compensation for the organizing work.

According to the above argument, we have to classify those collective goods which each member of a latent group has the "perfect consensus" about or a sufficiently high effective demand for, into the following two groups: the first

consists of the collective goods that can overcome the incomplete-contract problem and the second is consists of those that it is hard to solve the problem. It is in the first case that not only an active type of power-seekers but also money-craving political lobbyists have been ubiquitously observed. On the other hand, it is in the second case that we have been suffering from the collective action problem. In the following sections, it is shown that both cases are consistently founded on the behavior assumption of the self-interested political entrepreneur and the efficiency achieved in each case is examined. For these purposes, in the next section a three-stage game model is set up, which describes the process of providing a collective good, subjected to the incomplete-contract constraints.

3. The Base Model and the Basic Assumptions

3.1 The Time Line of the Game

In order to emphasize that the organizing work is prerequisite and an organizing player called a political entrepreneur can renegotiate after he carried it out, this section begins with setting up a three-stage game that divides the whole process of providing a collective good into the following three stages: the first is the organizing stage, the second is the renegotiation stage and the third is the production stage. If more than a threshold number of group members are organized by the political entrepreneur at the first stage and the managing work can be done at the third stage, then the collective good is provided. In this three-stage game, he has an opportunity to renegotiate with the organized members at the second stage, even though the political entrepreneur has to begin undertaking the organizing work without making any complete contract which ensures him a sufficient reward or compensation for his work. This is because each player involved in the first stage has his or her sunk cost at the end of the first stage. The time line is illustrated below. (Throughout this paper, the future outcomes are not discounted for simplicity.)

The Time Line of the Three-Stage Game with Incomplete-Contract

First Stage	Second Stage	Third Stage
Organizing work	Renegotiation on Efficient Output & Sharing	Managing Work for the Efficient Output

3.2 Players and Collective Good

We suppose a latent group comprised of n symmetric members and one political entrepreneur, and there are only two types of goods, a private good and a collective good, and that the collective good can be provided only if some political process has been successfully gotten though, where at least $C(n)$ members must be in advance organized into a cooperative network or team prior to supplying the collective good at the third stage. The above-mentioned $C(n)$ is called the "threshold number." It reflects the reality that without organizing sufficiently a large number of the group members into a cooperative network or a team in advance, it is hard for any political entrepreneur or pressure group to exert its bargaining power in political rent-seeking arenas. Such a cooperative network formation or a team formation which has to be made before coordinated actions is a necessary condition for any collective action or an indispensable factor of any collective action.

Furthermore, it is assumed that the collective good has a "coalition effect" in addition to a "mechanical effect" brought about by inputting the direct and indirect factors of production into the process of supplying the collective good. The coalition effect is brought about by an increase in the bargaining power of a cooperatively-networked group. The more the member size of the group is, the stronger the bargaining power is. This assumption is required to cope with collective goods such as the acquiring of government subsidies. Therefore, the collective good is an increasing function not only of the direct and indirect factors of production but also of the bargaining power of the organized members. For simplicity it is assumed that those two effects are separated, as in what follows.

Denote by $\varphi_1(Q)$ the output of the collective good brought about by the

mechanical effect of the production factor, Q, and by $\varphi_2(C)$ the coalition effect brought about by organizing the C number-size of members into a cooperative network. Both functions are assumed to be an increasing and concave function with the condition that $\varphi_1(0) = 0$ and $\varphi_2(0) = 0$. Then, the total output of the collective good, denoted by $\varphi(\mathrm{Q}, \mathrm{C})$, is defined by Eq.(1).

(1) $\varphi(\mathrm{Q},\ \mathrm{C}) = \varphi_1(Q) + \varphi_2(C)$, only if $C > C(n)$,
$= 0$, if otherwise.

As illustrated in the time line, the collective good is produced at the third stage—called the production stage—by way of the managing work of the political entrepreneur or someone else who can take over him, subjected to the constraint that at least the $C(n)$ number-size of members were organized at the first stage called the organizing stage and to the constraint that at the second stage called the renegotiation stage the political entrepreneur agrees upon taking on the managing work. If the political entrepreneur carries out the managing work, he has to spend some units of his time and energy, denoted by x_j, on that work at the production stage. The unit value of j player's time and energy ("work load" *en masse*) is denoted by E_j which is applied to the organizing work as well as to the managing work. It is assumed that the motive of each organized member to escape sharing the production cost of the collective good at the third stage can be overcome by the managing work.

The political entrepreneur knows better about how to provide the collective good, and is more skilled and/or talented for both the organizing work and the managing work than other members. Any member who dares to take over him at the third stage can carry out the managing work as long as the first and second stage have been already cleared, but less efficiently does, i.e., reduces the mechanical effect and/or the coalition effect to a lower level than the one achieved by the political entrepreneur. Regarding the organizing work, in order to emphasize the indispensability of some talented and skilled personal factors, it is assumed that any group member who tries to take over the political entrepreneur cannot organize the $C(n)$ size of members subject

to her income constraint in the first stage.

3.3 The Organizing Stage and Payoff functions

At the organizing stage, the political entrepreneur communicates with each member one by one, with a view to coordinating their behaviors into a cooperative action later at the production stage. He has to spend his own work-load on the activity aimed at organizing other members. It takes one unit of the workload to organize one member. The total amount of the work load at the organizing stage is denoted by z in generic term, if a group of players with the number-size z are organized. At each moment of his organizing one member (hereafter, each organized member at the first stage or beneficiary member at the third stage is called i member[7]), the political entrepreneur makes a proposal, called the "initial simple contract"[8], to each member. It stipulates two requirements: The first is the threshold level of the production factors required for producing the collective good at the third stage, denoted by Q_0, and the second is the amount of an equal share in Q_0, denoted by q_0, and defined by $q_0 = Q_0/C(n)$. Q_0 is set by a technological requirement, whilst $C(n)$ is by the political requirement mentioned above. (The precise definition is given by Eq.(4) after some relevant concepts are defined).

On the other hand, each member, when presented the proposal, has to decide on whether or not to go along with the proposed plan. This is a binary choice between "Accept" and "Reject." The choice of the former is denoted by 1

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[7] Each member is named after a discrete number but for the sake of mathematical convenience it is assumed that each member is located along a continuous line from 0 to n, denoted by $[0, n], \exists\, n$. Then, by the definition, the amount of z is equal to that of C in the absolute term.

[8]The initial simple contract is an inevitable result of incomplete contract. Refer to Edlin and Reichelstein(1996) and Che and Hausch(1999), as to the definition of the initial simple contract.

and the latter by 0, respectively. Denote the binary variable by v. If she sets v at 1 ("Accept"), she has to spend her work-lord, denoted by C_i, on learning the proposal and negotiating with the political entrepreneur. If otherwise (she chooses "Reject"), she incurred no cost. For simplicity, C_i is assumed as a constant parameter

The payoff of any i beneficiary player which is realized at the third stage, denoted by U_i, is comprised of the benefits gained by consumption of the private good and those of the collective good. The payoff function is a quasi-linear function of the private good, denoted by y_i, the amount of the production factors imputed by all organized beneficiary-players, denoted by Q which represents the mechanical effect, and finally the number size of the organized members, denoted by C which represents the coalitional effect. The payoff function based on those assumptions is defined by Eq.(2).

(2) $U_i = U_i(y_i, Q, C) = y_i + \theta_i\{\varphi_1(Q) + \varphi_2(C)\}, i \in [0, n].$

In the above (2), y_i is the amount of the private good consumed by the i beneficiary-player and θ_i is her valuation on the collective good.

If the i member actually spends the q_i amount of the production factor at the third stage, her income constraint is defined by Eq.(3).

(3) $I_i = y_i + C_i v + pq_i, \ , s.t., v = (1, 0), \ i \in [0, n],$

where I_i is her income, and p is the value of the production factor in terms of the private good (the numeraire in this section).

Using (2) and (3), Q_0 and $q_0 = Q_0/C(n)$ are defined by Eq.(4) and Eq.(4)' for a given $C(n)$.

(4) $U_i\big(I_i - C_i - pq_0, \ Q_0, \ C(n)\big) = Max_{q_i} U_i\big(I_i - C_i - pq_0, \ Q_0, \ C(n)\big), \ i \in [0, \ n].$

(4)' $p = \theta_i \, \varphi_1'(Q_0) \, C(n).$

Eq.(4) satisfies also the "perfect consensus" assumption defined by Olson

(Olson,1965: pp.59-60), firstly because when the actually organized size, C, exceeds $C(n)$, the actual equal burden share, Q_0/C, is lower than $Q_0/C\,(n)$, and secondly because when the optimal level of Q is derived under the condition of the actually organized member size being C, then the payoff can be increased. It means each group member is prepared to accept the initial simple contract.

Keeping it in mind that the work-lord spent on the activity to organize one member was assumed to be one unit and furthermore that the total work-load of the political entrepreneur is denoted by z, the amount of C is equal to that of z in the absolute terms. Therefore, on the assumption that the number unit is conversed by the work-load unit, Eq. (5) is derived.

(5) $C = z$.

If the conversion rate of C to z is defined as α, C is a linier increasing function of z, as defined by (5)'.

(5)' $C = \alpha z,\ \ \alpha > 0$.

Finally, let's define the payoff function of the political entrepreneur. When at the beginning of the organizing stage the political entrepreneur, denoted by j player, launches onto the organizing work, the political entrepreneur does not know whether or not he can organize more than $C(n)$ members subjected to his income constraint, denoted by I_j. So, he may have to stop the process of organizing other members on the way, when the total work-load of his organizing work has reached his income constraint before attaining the threshold number $C(n)$. If, on the contrary, he can organize at least $C(n)$ members within the limit of his income constraint, the game goes ahead to the next stage. In what follows, we take up this case where he can organize at least $C(n)$ members, subjected to his income constraint.[9] Then, the income

[9] Uncertain cases are coped with by introducing the entrepreneur's belief on the feasibility of his organizing work subject to his income constraint.

constraint of the political entrepreneur is given by Eq. (6).

(6) $I_j = y_j + E_j z + E_j x_j,$

where y_j is the amount of the private good consumed by the political entrepreneur, z is the work-load of the organizing work done at the first stage, and x_j, $x_j = (0, 1)$, is a binary variable and means the work-load of the managing work done at the third stage. E_j is the evaluator of one unit of the organizing work and that of the managing work in terms of the numeraire good.

The political entrepreneur also gains benefits not only from the private but also from the collective good. So, his payoff function, U_j, is defined by Eq.(7).

(7) $U_j = U_j(y_j, Q, C) = y_j + \theta_j\{\varphi_1(Q) + \varphi_2(C)\},$

where θ_j is the j player's evaluation of the collective good.

The feasibility condition that the political entrepreneur can organize at least $C(n)$ members subject to his income constraint is defined by (8).

(8) $z > C(n), \ s.t., E_j z + E_j x_j \leq I_j.$

In order to emphasize the significant roles of both the organizing work and the managing work, we assume here that without a sufficient benefit obtainable from the collective good at the third stage, the political entrepreneur is not motivated to bear the burden of the organizing work and the managing work. Q and C have to meet the relation (9) in order to clear the participant constraint of the political entrepreneur.

Denoting his belief by a probability of the feasibility, his payoffs are shown by expected values. It is easy to prove the main conclusions are the same.

(9) $U_j(I_j - E_j z - E_j x,\ Q,\ C) > U_j(I_j, 0,\ 0),$ for $\exists C \geq C(n)\ and\ \exists Q > 0.$

As shown in the fourth section, it may be assumed that the participant constraint of the political entrepreneur is satisfied.

3.4 The Renegotiation Stage

At the beginning of the renegotiation stage, both the political entrepreneur and the organized members observe the results of the first stage. If the number size of the organized members turns out to exceed, or to be at least equal to, the threshold level, the political entrepreneur has to decide on whether or not to carry out the managing work. Though anyone of the organized members would take over him at the production stage, she is less skilled for the managing work to be done at the production stage than the political entrepreneur and therefore, inflicts additional costs on other organized members. Since the political entrepreneur has already spent the work-load, z, on the organizing work and the organized member has already spent the work load, C_i, on the decision-making on whether to accept the proposal offered at the organizing stage, there arises the possibility that the political entrepreneur can renegotiate with the organized members on the compensation or reward for the organizing work already done by him and the managing work to be done from now.

According to the logical procedure of the incomplete-contract approach, it is assumed that the default payoffs depend on who has the property right to non-human capitals and assets required to undertake the political enterprise of providing the collective good. Offices, cars, materials for public relations, and members' list are some of the examples.

The efficient level of the collective good is calculated on the basis of the information on the member size of the actually organized members. The total net-benefits calculated on the basis of this information are allocated to the political entrepreneur and the organized members in the accordance with the Nash bargaining rule. If they are satisfied with the conclusion of the renegotiation, or if some member could take over the political entrepreneur in

default, the game goes ahead to the third stage. If not, the game ends at the renegotiating stage.

The renegotiating stage is an image or notion which represents such a decision-making phase that if he has to decide on whether to go ahead or not, any social organizer is faced with and it is inevitable for him to come to. It is because even if he started as a *bona fide* enterpriser, at some point in time he is sure to face with the situation where he has to reconsider whether to go ahead with the social activity he has been involved with, as far as he has to make a living by his own work.

3.5 The Production Stage

At the third stage called the production stage, the collective good is produced and supplied in accordance with the renegotiations or re-contracts made at the second stage. If the actual organized members' size, C, is larger than $C(n)$, the output of the collective good becomes larger than the one stipulated by the initial contract, because additional effects are brought about on the condition that the organized members bear the direct cost of producing the collective good on an equal basis. These additional effects are divided into the following two: the first is the mechanical effect brought about by recalculating the efficient level of the collective good—an increase in Q— and the second is the coalitional effect—an increase in C.

The Latent Group at the Production Stage

The "latent group" or the "large group" defined by Olson (1965) is another term to express the group which suffers from the free-rider problem or the public good problem. Though the concept of this group is crucial to the logic of collective action, it is not formulated in a clear way. However, according to the incomplete-contract approach, we can give the precise definition of the latent group. According to the definition given by Olson (Olson, 1965; pp.43-51), the latent group has to meet the following three conditions: (i) that there is no privileged player, (ii) that the payoff gained by collective action is bigger than the status quo payoff, and (iii) that once organized beyond the threshold, the

payoff which any even if any one player free-rides at the production stage, each organized player gains is still bigger than the status quo payoff, and therefore that the free-rider tends to be overlooked and any deviating player is allowed to free-ride on other members' bearing the cost of producing the collective good.

The first condition (i) is defined by (10) and (10)'.

(10) $U_i(I_i - C_i - pQ_1,\ Q_1,\ 1) < U_i(I_i, 0, 0)$, for any organized member i.
(10)' $Q_1 = Argmax_{q_i}\, U_i(I_i - C_i - pQ,\ Q,\ 1),\ s.t.,\ q_i = Q.$

The second condition (ii) is the same as the participation constraint given by Eq.(4), and finally the third condition (iii) is defined by (11) and (11).'

(11) $U_i(I_i - C_i - pq_i, Q, C) > U_i(I_i, 0, 0)$, for $\forall C > C(n),\ \forall Q > Q_0$ and $q_i = Q/C$.
(11)'
$U_i(I_i - C_i - p\,Q_{C-1}/(C-1),\ Q,\ C) > U_i(I_i, 0, 0),\ Q_{C-1} = Argmax_{\,Q=(C-1)q_i}\, U_i$.

The above two inequalities, (11) and (11)', mean that if the collective action is organized beyond the threshold level, it still pays one of the organized members to bear the burden of some additional cost in spite of someone's deviating from paying the direct cost of production.

On the other hand, under the third condition, the incentive condition for any organized player to deviate from bearing the direct cost of production at the production stage is defined by the following relation (12).

(12) $U_i\big(I_i - C_i,\ (C-1)\cdot q_{i,(C-1)},\ C\big) > U_i\big(I_i - C_i - pq_i,\ C\cdot q_{i,C},\ C\big)$,
$q_{i,C} = Q_C/C$, and $q_{i,(C-1)} = Q_{C-1}/(C-1)$,

In the above definitions, Q_C and Q_{C-1} mean, respectively, the optimal Q maximizing U_i for a given C and $C-1$.

To the extent that the collective good is of a public good nature, each

member of the latent group is motivated to deviate from the burden-sharing in the direct cost of producing the collective good. However, in the analytical framework of the basic model set up in this chapter, it is assumed that the free-rider problem arising in the provision stage is overcome by the managing work of the political entrepreneur at sufficiently a low enforcement-cost, once he has organized those member-players into a cooperative network or team. The enforcement cost is included in the work-load, E_j, of the managing work.

4. The Analysis

In this section, the three-stage game set up in the previous sections is analyzed, in accordance with the incomplete-contract approach. For this purpose, first of all, we calculate both the default payoffs and the renegotiation payoffs, on which the political entrepreneur's decision on whether to go ahead or not is dependent. In what follows, it is assumed that an increase in the net payoff brought about by the renegotiation is shared between the political entrepreneur and the organized members at a ratio of μ to $(1-\mu)$.

4.1 The Default Payoffs

The default payoffs depend on who has the property right to non-human capitals and assets required to provide the collective good at the third stage. Offices, cars, non-human capitals for publicity works, supporters' list and so on are the examples of those non-human capitals and assets. The organizing work affects the productivity of those non-human capitals and assets as follows: The more the organizing work is undertaken and therefore the more members are organized, the more politically influential those non-human capitals and assets become. The relation between C and $\varphi_2(C)$ represents such a political and technological background. Why do the default payoffs depend on the property right structure of those non-human capitals and assets? It is because the owner has legal power to decide on how to use them. Those assets may belong to the political entrepreneur or to the organized

members. In what follows, we examine and derive the default payoffs arising in each property-rights structure, in turn.

Case 1: The Default Payoff under the Political Entrepreneur's Ownership

If the renegotiation breaks down under the political entrepreneur's ownership of the non-human capitals and assets and therefore he sets x_j at the zero level, the default payoff of the political entrepreneur, denoted by $U_j^D(PE)$, and that of the organized member, denoted by $U_i^D(PE)$, are defined by (13) and (14), respectively.

(13) $U_j^D(PE) = U_j(I_j - E_j z,\ 0, 0) < U_j(I_j,\ 0, 0)$.
(14) $U_i^D(PE) = U_i(I_i - C_i,\ 0,\ 0) < U_i(I_i,\ 0, 0)$.

On the contrary, if the political entrepreneur sets x_j at unity, that is, if he carries out the managing work indispensable for finalizing the process of providing the collective good, and as a result, if the output of the collective good amounts to $\varphi_1(Q) + \varphi_2(C)$, then his payoff would change to $U_j(I_j - E_j z - E_j x_j,\ Q,\ C)$. If, however, this payoff is not sure to exceed the status quo payoff, there may exist satisfying such a combination,(C, Q), which meets the inequality (15) for those Q and C.

(15) $U_j(I_j - E_j z - E_j x_j, Q, C) < U_j(I_j - E_j z, 0,\ 0) \equiv U_j^D(PE)$,

If the condition of (15) holds, it is rational for the political entrepreneur to set x_j at zero, and then, the default payoff of the political entrepreneur and that of the organized member are also given by (13) and (14), respectively.

In this chapter, it was assumed that once C can exceed the threshold $C(n)$, the payoff which is achieved by the maximizing Q for the given C meets the participation constraint. Therefore, the case where the inequality (15) arises can be omitted.

Case 2: The Default Payoff under the Organized Members' Ownership

If the renegotiation breaks down under the organized members' ownership

of the non-human capitals and assets, they may take over the managing work to be done by the political entrepreneur by dismissing him. However, even if a sufficient size of the organized members, denoted by $C,\ s.t.,\ C > C(n)$,has been already organized just before the renegotiation stage begins, they cannot completely take over the skills and talents for the managing work which the political entrepreneur have, according to the basic assumption. Such an incompetence is approximately formulated by the assumption that if the political entrepreneur is dismissed, the production cost to provide the collective good is raised from q_i to $(1+\lambda)q_{i,}\ \exists\lambda > 0$, for anyone of the organized members. Then, the dismissal is remunerative for the organized members, only if the inequality (16) is satisfied.

(16) $\theta_i\{\varphi_1(Q) + \varphi_2(C)\} - (1+\ \lambda)pq_i > 0$, for any i.

Taking the participation constraint defined by (4) into account, the inequality (16) holds, as long as λ is not so large and/or C is large enough. In what follows, we assume there exist such a combination as to meet the inequality condition (16), in order to go ahead to analyze the third stage. Then, under the organized members' ownership, the default payoff of the political entrepreneur and that of the organized members, denoted by $U_j^D(OM)$ and by $U_i^D(OM)$, respectively, are defined by (17) and by (18) for the combination (Q, C) meeting the inequality condition, (16).

(17) $U_j^D(OM) = U_j(I_j - E_j z,\ 0,\ 0) < U_j(I_j,\ 0,\ 0)$.
(18) $U_i^D(OM) = U_i(I_i - C_i - (1+\lambda)pq_i,\ Q,\ C) > U_i(I_i - C_i\ 0,\ 0)$

The inequality part of (18) is derived from (16). The inequality condition (18) implies that if under their ownership of the non-human capitals and assets the organized members go ahead with providing the collective good on their own after dismissing the political entrepreneur, they can get better off than if the game comes to an end at the second stage. In the definition (17), it is assumed that the political entrepreneur is excluded from consuming the collective good after dismissal.

The Logic of Collective Action, Reconsidered 3

The logic of collective action disregards the possibility of the renegotiation. This disregard of the renegotiation is actually the same as to assume the situation where x_j is always set at zero in the case 1, or where the political entrepreneur is taken over at the third stage in the case 2. Under the ownership rule of Case 1, not only the default payoff of the political entrepreneur, $U_j^D(PE)$ defined by (13), but also the default payoff of the organized member, $U_i^D(PE)$ defined by (14), is worse than the status quo. Therefore, when he decides on z at the first stage, it is optimal to set it at the zero level, i.e., it is rational for him not to launch into the organizing work. This leads to a collective failure.

On the other hand, under the ownership rule of Case 2, the default payoff of the political entrepreneur and that of the organized members are given by $U_j^D(OM)$ and by $U_i^D(OM)$, respectively. According to the default condition (17), the default payoff of the political entrepreneur is worse than the status quo. This means that it is optimal for him to set z at the zero level in the first stage.

In any case, the political entrepreneur rejects the organizing work which should be undertaken in the first stage. This is because the political entrepreneur's belief that the renegotiation would have fallen into collapse in the second stage is the same as the belief that there is no possibility of the renegotiation.

4.2. The Renegotiation Payoff

Suppose that both parties, i.e., both the political entrepreneur and the organized member, calculate the optimal level of the collective good at the renegotiation stage on the basis of the information of the number size of the actually-organized members, denoted by C. If the net-benefit to each party of this optimal level is positive, both parties have incentives to cooperate in producing that level of the collective good at the third stage. According to the assumption, this positive net-benefit is shared at the ratio of "μ to $(1-\mu)$"

between the political entrepreneur and the organized members. In what follows, the suffixes of θ_i, q_i and I_i are taken away, if not necessary, since the organized members are assumed to be symmetric. The net-payoffs gained at the optimal level of the collective good are also dependent on the ownership structure. In this section, those net-payoffs gained under each ownership structure are defined.

Case 1: The Renegotiation Payoff under the Political Entrepreneur's Ownership

If the ownership of the non-human capitals and assets belong to the political entrepreneur, the cooperative payoff for a given C achieved at the third stage, denoted by $B^{PE}(C)$, is determined by finding the maximizing value of Q and $q = Q/C$, for a given C, $s.t.$, $C = z$. That cooperative payoff is defined by Eq. (19).

(19) $B^{PE}(C) = Max_Q \left[\int_0^C \{\theta(\varphi_1(Q) + \varphi_2(C)) - pq\} di - \{E_j x_j - \theta_j \cdot (\varphi_1(Q) + \varphi_2(C))\}\right]$, for $x_j = 1$.

In the above, the condition, $x_j = 1$, is required, since the managing work must be carried out at the third stage. Denote the maximizing Q by Q^{PE}, and define $q^{PE}(C)$ as $q^{PE}(C) = Q^{PE}/C$. Then, $B^{PE}(C)$ is determined by (20).

(20) $B^{PE}(C) = C[\theta\{\varphi_1(Q^{PE}) + \varphi_2(C)\} - p\,Q^{PE}/C] - [E_j - \theta_j\{\varphi_1(Q^{PE}) + \varphi_2(C)\}]$

Each organized member gains $(1-\mu)\,B^{PE}(C)/C = (1-\mu)B_i^{PE}(C)$, where $B_i^{PE}(C)$ is defined by (20)'.

(20)' $B_i^{PE}(C) = [\theta_i\{\varphi_1(Q^{PE}) + \varphi_2(C)\} - p\,Q^{PE}/C] - [E_j - \theta_j\{\varphi_1(Q^{PE}) + \varphi_2(C)\}]/C$.

Then, the renegotiation payoff of the political entrepreneur and that of the organized member are given by (21) and (22) for the given $C = z$, respectively.

(21) $U_j^{PE}(C) = U_j(I_j - E_j z, 0, 0) + \mu B^{PE}.$

(22) $U_i^{PE}(C) = U_i(I_i - C_i, 0, 0) + (1-\mu)B_i^{PE},\ s.t.,\ C = z.$

Case 2: The Renegotiation Payoff under the Organized Members' Ownership

If the contract that an optimal level of the collective good is produced by the managing work of the social entrepreneur is agreed between both parties under the organized members' ownership, each organized member can save λpq, but the political entrepreneur has to set x_j at unity. The cooperative benefit, denoted by $B^{OM}(C)$, is determined by the maximizing Q or $q = Q/C$ for the given $C = z$. The cooperative payoff, $B^{OM}(C)$, is determined by (23).

(23) $B^{OM}(C) = Max_{\ Q}\left[\int_0^C \lambda pq \cdot di - E_j x_j\right] = \lambda p Q^{OM}(C) - E_j,\ for\ x_j = 1.$

Denote by Q^{OM} the optimal level of Q and by $q^{OM}(C)$ the optimal value of q for the given C. Then, those optimal values satisfy (23). Furthermore, define B_i^{OM} as $B_i^{OM}(C) = B^{OM}(C)/C$, then, Eq.(24) is derived.

(24) $B_i^{OM}(C) = \lambda pq^{OM}(C) - E_j x_j/C\ ,\ \ x_j = 1.$

Then, under the organized members' ownership, the renegotiation payoff of the political entrepreneur, $U_j^{OM}(C)$, and that of the organized member,$U_i^{OM}(C)$, for the given C, are defined by (25) and by (26), respectively.

(25) $U_j^{OM}(C) = U_j(I_j - E_j z,\ 0,\ 0) + \mu B^{OM}(C).$

(26) $U_i^{OM}(C) = U_i(I_i - C_i - (1+\lambda)pq^{OM}(C),\ Q^{OM}(C),\ C) + (1-\mu)B_i^{OM}(C)$

In the above definitions, it is assumed that $B^{OM}(C)$ is positive, and furthermore, that $U_j^{OM}(C)$ and $U_i^{OM}(C)$ meet the participation constraints.

4.3 The Comparison of Efficiency under Two Ownership Structures

In this subsection, optimal decisions at the first stage are examined according to the procedure of the backward induction. The individual

optimality is compared with the social optimality under each ownership structure. The comparison answers to the question, "which one of the two ownership-structures should be adopted?"

4.3.1 The Optimal Decisions under the Political Entrepreneur's Ownership

The Participants' Constraints

At the first stage of the three-stage game, the political entrepreneur has to decide on the individually-rational level of z or C so as to maximize the renegotiation payoff, defined by U_j^{PE} which he gains at the third stage. On the other hand, the organized member decides on their individually-rational levels of Q so as to maximize her renegotiation payoff, defined byU_i^{PE}. The participant constraint of the political entrepreneur and those of the organized members under the political entrepreneur's ownership are defined by (27) and by (28), respectively. In what follows, it is assumed that those conditions are met.

(27) $U_j^{PE}(C) \geq U_j(I_j, 0, 0)$, and
(28) $U_i^{PE}(C) \geq U_i(I_i, 0, 0)$, $s.t.$, $C = z$, $C > C(n)$.

The Social Optimal Levels of Z (C)and Q

First of all, we derive the social optimal conditions as a yardstick for comparison. The social optimal level of z and that of Q, denoted by z^* and by Q^*, respectively, are derived from maximizing the total payoffs of all players, M, which is defined by (29).

(29) $M = \int_0^C U_i^{PE}(I_i - C_i - pq(C), Q, C) \cdot di + U_j^{PE}(I_j - E_j z - E_j x_j, Q, C)$,
$s.t.$, $C = z > C(n)$, $and\ x_j = 1$.

By taking into consideration the concave and increasing nature of both $\varphi_1(Q)$ and $\varphi_2(C)$, and by inserting the definitions of the payoff functions into

(29), we can derive z^* and Q^* from the first derivatives defined by Eq. (30) and (31).

(30) $\partial M/\partial C = \partial M/\partial z = I_i + \theta_i\{\varphi_1(Q) + \varphi_2(C)\} + C\theta_i\varphi_2'(C) + \theta_j\varphi_2'(C) - (C_i + E_j)$,

(31) $\partial M/\partial Q = C\theta_i\varphi_1'(Q) + \theta_j\varphi_1'(Q) - p,\ for\ \theta_i = \theta,\ i \in (1, C)$.

According to the participant constraint of the political entrepreneur, defined by (9), $\varphi_1(Q)$ and $\varphi_2(C)$ have to be so large enough relative to the work-load, $E_j \cdot (z + x_j)$ for $x_j = 1$, as to be able to motivate him to launch into the organizing work for collective actions. Therefore, since the income constraint of the organized player implies the inequality condition that $I_i - C_i > 0$, it turns out that that as long as θ_i is not so small, $\partial M/\partial C = \partial M/\partial z \geq 0$. Therefore, on the condition that each player has sufficiently high evaluation on the benefits obtainable from the collective good, the optimal level of z is determined by (30)'.

(30)' $z^* = \max\ z,\ s.t.,\ 0 \leq z \leq I_j$.

On the other hand, if the inner solution for (31) is assumed to exist for the sake of investigating the characteristics of the optimal Q, the social optimal level of Q is determined by Eq.(31)'.

(31)' p $= C\theta_i\varphi_1'(Q) + \theta_j\varphi_1'(Q)$, for $Q = Q^*$.

The optimal condition (31)' means that the social optimal level of the collective good, Q^*, is determined so as to satisfy the condition that the price of the production factor required for the collective good is equal to an increase in the total benefits to all players of the collective good.

The Individually-Rational Levels of Z and Q

Next, let's derive the individually-rational levels of Z and Q. Under the political entrepreneur's ownership, the political entrepreneur chooses the

individual optimal of $z(=C)$, denoted by z_{PE}^{*}, so as to maximize $U_j^{PE}(C:C=z)$ defined by (21), and the organized members choose the individual optimal of Q, denoted by Q_{PE}^{*}, so as to maximize U_i^{PE} defined by (22). They are derived by examining the first derivative conditions, (32) and (33), respectively.

(32) $\partial U_j^{PE}(C:C=z)/\partial C = -E_j + \mu\theta_i\{\varphi_1(Q) + \varphi_2(C) + \theta_j\varphi_2'(C)\}$, for $z = z_{PE}^{*}$.

(33) $\partial U_i^{PE}/\partial Q = (1-\mu)[\theta_i\,\varphi_1' - p/C + \theta_j\varphi_1'(Q)/C]$, for $Q = Q_{PE}^{*}$.

Assuming the inner solutions of (32) and (33) for the sake of investigating the characteristics of the individual optimality of $z(=C)$ and that of Q, Eq.(32)' and (33)' are obtained, respectively.

(32)' $E_j = \mu\theta_i\{\varphi_1(Q) + \varphi_2(C) + \theta_j\varphi_2'(C)\}$, for $z = z_{PE}^{*}$.

(33)' $p = C\theta_i\varphi_1'(Q) + \theta_j\varphi_1'(Q)$, for $Q = Q_{PE}^{*}$.

The optimal condition (32)' means that at the optimal level of $z\,(=C)$, a marginal increase in the work-load of the organizing work, E_j, is equal to the organized member's share in the benefits obtainable from the collective good and from an increase in the collective good brought about by an increase in the coalition effect.

On the other hand, (33)' means that the factor cost required for the marginal increase in the collective good, i.e., the direct production cost to produce the collective good, is equal to an increase in the benefits to all members, that is achieved by a marginal increase in the collective good brought about by a marginal increase in Q.

4.3.2 The Individually-Rational Decisions under the Organized Members' Ownership

Though not be explicitly defined, it is assumed that U_j^{OM} and U_i^{OM} also

meet the participants' constraint.

The Individually-Rational Decision at the First Stage

Under the organized members' ownership, the political entrepreneur chooses the optimal level of $z = C$ so as to maximizes U_j^{OM}(C: C=z) defined by Eq.(25), whilst the organized members choose the optimal level of Q so as to maximizes U_i^{OM}(C) defined by Eq.(26). Deriving the first derivatives of (25) and (26), Eq.(34) and (35) are obtained, respectively.

(34) $\partial U_j^{OM}(z: z = C)/\partial z = -E_j < 0.$
(35) $\partial U_i^{OM}/\partial z = \theta_i \varphi_1'(Q) - (1 + \mu\lambda)p/C.$

Denote the individually-rational amount of z by z_{OM}^*, and that of Q by Q_{OM}^*. Then, from (34) it is obvious (34)' holds, i.e., $z_{OM}^* = 0$. Furthermore, assuming the inner solution of Eq. (35), z_{OM}^* is determined by Eq. (35)'.

(34)' $z_{OM}^* = 0.$
(35)' $(1 + \mu\lambda)p = C\theta_i \varphi_1'(Q)$, for $Q = Q_{OM}^*$.

The optimal condition (34)' means that under the organized members' ownership, the political entrepreneur has no incentive for the organizing work, as long as he is excluded from consuming the collective good at the third stage. If, on the contrary, he is not excluded, he determines the optimal level of z so as to equate the work load of one unit of the organizing work with an increase in the benefit of the collective good, brought about by a marginal increase in the organizing work.[10] This relation is given by Eq. (34)".
(34)" $E_j = \theta_j \varphi_2'(C)$

[10] If he is not excluded from the consumption of the collective good, that is, he can free-ride on the cost-burden borne by the organized members, the political entrepreneur's payoff function is changed into the following one: $U_j^{OM} = I_j - E_j z + \theta_j\{\varphi_1(Q) + \varphi_2(C)\}$. Eq. (34)" is derived from the inner solution of the first derivative of this revised payoff function.

On the other hand, (35)' means that under the same ownership, the organized members determine their individual-rational level of Q so as to equate an increase in the benefits to all organized members of the marginal increase in the collective good brought about by the marginal increase in the direct production factors with the marginal increase in the cost of direct production factors plus the marginal increase in the indirect cost associated with their incompetent managing work.

4.3.3 The Individual Optimality *vs.* the Social Optimality

Comparison under the Political Entrepreneur's Ownership

In order to compare the individual optimality under the political entrepreneur's ownership with the social optimality, the set of the individually-rational levels of z and that of Q, denoted by (z_{PE}^*, Q_{PE}^*), is compared with the social optimal set, denoted by (z^*, Q^*).

Firstly, from the comparison of (30)' with (32)', it is obvious that $z_{PE}^* = C_{PE}^* < z^* = C^*$. That is, both the organizing work and the optimal organized members' size under the political entrepreneur's ownership are less than the social optimal level.

Secondly, from the comparison of (31)' with (33)', it is obvious that $Q_{PE}^* = Q^*$. This relation means that the individually-rational level of the production factors provided by the organized members under the political entrepreneur's ownership are equal to the social optimal level.

Comparison under the Organized Members' Ownership

In order to compare the individual optimality under the organized members' ownership with the social optimality, the optimal levels of z and that of Q under the organized members' ownership, denoted by (z_{OM}^*, Q_{OM}^*), are compared with (z^*, Q^*).

Firstly, from the comparison of (30)' with (34)', it is obvious that $z_{OM}^* = C_{OM}^* < z^* = C^*$.[11]

[11] Furthermore, from the comparison of (30)' with (34)" it is obvious

Secondly, from the comparison of (31)' with (35)', the following equations are derived: $p = C\theta_i\varphi_1'(Q_{OM}^*)/(1+\mu\lambda) = C\theta_i\varphi_1'(Q^*) + \theta_j\varphi_1'(Q^*)$. By comparing the second with the third in these equations and by taking the negativity of the second derivative of $\varphi_1(Q)$, it is proved that $Q_{OM}^* < Q^*$.

In conclusion, under the ownership of the organized members the individually-optimal level of the organizing work, denoted by z_{OM}^*, the one of the organized members' size, denoted by C_{OM}^*, and that of the direct production factors, denoted by Q_{OM}^*, are all less than the social optimal level.

4.4 The Political Entrepreneur's Ownership vs. the Organized Members' One

In this subsection the efficiency of the individually-rational levels of z and Q under the political entrepreneur's ownership is compared with the ones under the organized members' ownership, That is, $(z_{PE}^*,\ Q_{PE}^*)$ is compared with (z_{OM}^*, Q_{OM}^*).

Firstly, from the comparison of Eq.(32)' with (34)' it is derived that $z_{PE}^* > z_{OM}^* = 0$.

Incidentally, if we take up the case that the political entrepreneur is not excluded from free-consumption of the collective good, (32)' should be compared with (34)". From this comparison, the following equations are derived: $E_j = \mu\theta_i\{\varphi_1(Q_{PE}^*) + \varphi_2(z_{PE}^*) + \theta_j\varphi_2'(z_{PE}^*)\} = \theta_j\varphi_2'(z_{OM}^*)$. Then, taking the negativity of the second derivative of $\varphi_2(C)$ into consideration, the following proposition is derived: that as long as $\theta_i\mu$ *is not so low relatively* θ_j, $z_{OM}^* < z_{PE}^*$. That is, in the case that the political entrepreneur is not excluded from the free-consumption of the collective good, the political entrepreneur's evaluation of the collective good relative to the one of the organized members and/or his sharing in the cooperative benefits are crucial for deciding whether the political entrepreneur's ownership is superior to the organized members'

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that even if the social entrepreneur is not excluded from the free consumption of the collective good, the individually-rational level of z or C is less than z^*.

ownership, if judged by the amount of z or C.

Secondly, from the comparison of (33)' with (35)', the following equations are derived: $p = C\theta_i\varphi_1'(Q_{PE}^*) + \theta_j\varphi_1'(Q_{PE}^*) = C\theta_i\varphi_1'(Q_{OM}^*)/(1+\mu\lambda)$. Taking the negativity of the second derivative of $\varphi_1(Q)$ into consideration, it is obvious that $Q_{PE}^* > Q_{OM}^*$. That is, the direct production-factors provided by the organized members under the political entrepreneur's ownership are more than those under the organized members' ownership.

To sum up the first and second analytical propositions derived in this subsection, we may conclude by saying that *not only* z (C) *but also* Q *is larger under the ownership structure of the political entrepreneur than under the one of the organized members.* That is, it is better to leave the ownership of non-human capitals and assets to the political entrepreneur, if any collective good should be provided on a larger scale by way of collective actions organized by the political entrepreneur. This is because the political entrepreneur can avoid the risk of dismissal—the risk of the sunk organizing work being ignored—arising just after he has finalized the organizing work, if he has the ownership of the non-human capitals and assets required for the later stage of producing the collective good.

5. Concluding Remarks

According to the Olson's logic of collective action, a "large group" or "latent group" is organized into a cooperative network or team, only if some selective-incentives are in advance provided for the organized members. In this chapter, an alternative way to overcome the problem of collective action was presented. It is an application of the property-rights approach to the collective-action problem. The alternative way was called the "incomplete-contract approach" in this chapter, since the problem of collective action is caused by the "holdup problem" with the organizing work, i.e., no guarantee of a compensation or reward for the organizing work undertaken by the political entrepreneur prior to providing any collective good. The ownership of non-human capitals and assets plays the role of a key to solve this collective action problem. Even though the alternative way is not

sufficiently efficient compared to the social optimality, it is sure that the property-rights approach could open a new way to the problem of collective action. In this chapter, the political entrepreneur's ownership and the organized members' ownership are examined and compared in order to judge which is better from the perspective of the provision level of a collective good.. The main results and implications are summarized below.

Firstly, compared to the social optimality, the number size of the organized members under both types of the ownership is smaller than the social optimal size. On the other hand, whilst the individually-rational level of the direct production factors under the political entrepreneur's ownership is the same as the socially optimal level, the one under the organized members' ownership is lower than the social optimality.

Secondly, on the condition that the political entrepreneur is excluded from the free-consumption of the collective good just after he has finalized the organizing process, the organizing work is undertaken on a larger scale under the ownership of the political entrepreneur than under the one of the organized members.

Though incidentally, on the other hand, if the political entrepreneur is not excluded, the above comparison is loosened to the following one: that if the political entrepreneur's evaluation of the collective good, θ_j, is not so high relatively to θ_i on the condition that the share to him of the cooperative net-benefit, $\mu_,$, is given, then, he tends to carry out the organizing work and therefore to increase the number size of the organized members on a large scale under the political entrepreneur's ownership than under the organized members' ownership. These results imply that the lower the political entrepreneur's evaluation of the collective good is, *ceteris paribus*, the larger the number size of the organized members is under the political entrepreneur's ownership to non-human capitals and assets than under the ownership of the organized members. Then, on those conditions the ownership of the political entrepreneur is superior to the one of the organized members for the sake of increasing the organizing work and the size of the organized members.

The above implications suggest that even though candidates for the political entrepreneur or representative politicians are not interested in the collective good itself, those candidates should self-support non-human capitals and assets required for political activities in order to encourage them to organize a group of members into a cooperative network on a larger scale. Though many of the so-called "parachute candidates are of such a type, those non-human capitals and assets are usually provided by supporting groups and therefore they are not sufficiently motivated to increase the size of supporting members.

Thirdly, the organized members bear the higher cost to produce the collective good or provide the more production factors under the political ownership to non-human capitals and assets than under the ownership of the organized members. This result implies that in order to encourage the organized members to increase their contribution to an increase in the collective good, the political entrepreneur's ownership is superior to the organized members' ownership.

Generally speaking, as long as candidates for the political entrepreneur are of a politician type in the sense that they are not so concerned in common interests themselves, the ownership structure in which the political entrepreneur has the ownership to non-human capitals and assets required for political activities is superior to the alternative one, for the sake of achieving common interests on a large scale.

Then, the next problem arises as following: how the political entrepreneur finances the cost of those non-human capitals and assets. In the next chapter this problem is examined.

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Chapter 2
Who does take the initiative in providing voluntarily a public good ?: Personal Requisites for the Social Entrepreneur

By taking into consideration not only the indispensability of, but also the free-riding motives for, the work to organize the beneficiaries of a public good into a cooperative group before the process of supplying the public good on a voluntary basis begins, the problem, "what type of persons take the initiative in providing the public good," is examined in the analytical framework of the waiting game. In this chapter the candidate player who takes on the organizing work is called the "social entrepreneur." Furthermore, it is proved that the social entrepreneur chooses the "not-for-profit" constraints based on the basis of rational calculus. From the analysis of the "waiting game" model, the following propositions are derived: that talents and skills for the organizing and managing work, discount rate, and skills for negotiations are the most crucial personal requisites for the social entrepreneur

1. Introduction

In a society comprised of long-lasting communities, the secondary emotional-systems spontaneously develop, based on and connected with, the primitive emotional mechanisms. Without a formal enforcement system, the society's members tend to obey the majority ethical norms which are the notional forms of those secondary emotions. Those ethical norms are usually comprised of various ethical affections driving the society members to take cooperative behaviors such as solidarity, sympathy and compassion. If these ethical norms are evaluated in terms of the emotional value distinguished from the instinctive value and can be counted in an alternative utility, named the "emotional utility," of each individual, they cannot be dismissed in providing a public good associated with some ethical value.[12]

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[12] When Hutcheson (1747) insisted that sympathetic and altruistic behaviors are of an innate human nature, he seems to have assumed the existence of

In a society composed of those long-lasting communities, furthermore, the objects of the public good provided by the social entrepreneur are not limited to those associated with the emotional utility. For instance, the public good whose utility has an instinctive origin but is associated with some mission value, such as preservation of natural environments, protection of wild life, revival of impoverished local societies and collection of political funds, are included in the objects of the public good provided by the social entrepreneur. In this chapter, the social entrepreneur who provides those public goods on a voluntary basis is taken up and personal requisites for the social entrepreneur are derived on the assumption that the emotional utility can be re-evaluated, by way of a conversion factor, in terms of the instinctive utility and that the public goods associated with a mission value are counted in the instinctive utility function of a "well-behaved" type.

Prior to the stage of providing a public good on a voluntary basis, the work of organizing the beneficiaries of the public good into a contributing or cooperative group is indispensable for achieving their common interests, particularly, if they belong to a large group, and someone has to take on the organizing work. However, the costly aspects of the organizing work have been overlooked in the traditional literature not only on the logic of collective actions but also on the private provision of public goods. Those costly aspects are not only the indispensability of the costly organizing work itself but also the "incomplete contract" problem associated with the organizing work. It is in a sharp contrast with the managing work which coordinates the beneficiaries of the public good into a contributors' network at the stage of providing the public good. This contrast arises not only because anyone recognizes the managing work to be indispensable for the private provision of a public good but also because the managing work is not faced with the hold-up problem, though it suffers from the agent problem. In any way, the

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those civil societies in which the secondary emotional system had been already developed. The "conventions" of Hume (1739) and the "sympathy" of Smith (1759) are also the spontaneous ethical institutions which assume a long-standing civil society.

social entrepreneurship is comprised of the "organizing work" at the ex ante stage and the "managing work" at the provision stage.

Even if people are ready to share the direct cost to provide for a public good, they do not want to become a social entrepreneur and are quite often willing to free-ride on someone's taking the lead, in particular, on the organizing work done by other persons. However, unless anybody takes on the organizing work, no public good is provided and the inefficient status quo continues until the end of their time-horizons, which is the worst scenario.

In this chapter, the free-rider's problem with the organizing work above mentioned is considered to be caused by the "incomplete contract" problem or the "hold-up" problem, with which in deciding on whether to take on the organizing work, any candidate for the social entrepreneur is faced. That is, the organizing work of the social entrepreneur has to be done without any verifiable guarantee.

On the other hand, both a political entrepreneur in the arena of "for-political profits" enterprises and a business entrepreneur in the arena of "for-business profits" enterprises have a "residual-claimers" solution to the hold-up problem.[13] A volunteer type of entrepreneur is the concept which is implicitly assumed to be freed from the hold-up problem. In any case of those other types of entrepreneurs than the social entrepreneur, however, their preference functions are of a polar type, that is, both the political entrepreneur and the for-profit entrepreneurs are assumed to have a preference function of pecuniary variables or something on a par with such pecuniary ones, which are exclusive of factors creating an emotional utility and/or a mission value. By contrast, a volunteer type of entrepreneur is at the opposite extreme form those two types in the sense that his preference is an increasing function of collective goods or missions-values exclusive of or thinking light of pecuniary rewards. The social entrepreneur is also distinguished from those other three types by its preference which is a

[13] Refer to Wagner (1966) and Frolich et al (1971) as to the political entrepreneurship, and see Alchian and Demsetz (1972) as to the for-profit entrepreneur.

function of not only pecuniary rewards but also emotional utility and/or mission-values.

Regarding the managing work in the provision stage, it is needless to say that the social entrepreneur in common with those other types is faced with the agent problem. The rational hypotheses on the not-for-profit organizations have been put forward as a solution to this agent problem.[14] In this chapter, those forerunners' hypothetical models are refined by taking it into consideration that the social entrepreneur should be recognized as an integral agent-factor whom those models overlooked.

If the social entrepreneur is given a right place as a key player in the voluntary provision of public goods, it is conjectured that he can alleviate the seriousness of both the agent problem and the incomplete-contract one. For example, since the agent problem with the managing work is caused by the principals' mistrust of the agent's honesty in funds management, it may be, if not fully, alleviated by the agent's appealing for the not-for-profit constraints on his initiative, because such an institutional scheme for allaying the principals' mistrust but constraining the agent's chance to increase his revenues by sabotage can be carried out by the social entrepreneur whose utility can be enhanced with non-pecuniary factors. On the other hand, the incomplete-contract problem with the organizing work may be also solvable, if the social entrepreneur himself can work out and carry out the incentive schemes which can reward or compensate him for the incompletely-contracted organizing work, as well as the managing work.

Once the social entrepreneur is acknowledged to be a key player in the private provision of public goods, the next question we have to ask is the following: who are willing to take on the role of a social entrepreneur. This question must be answered, because we cannot take it for granted that a social entrepreneur come into existence from scratch, but because we can assume only that some candidates for the social entrepreneur, if any, are

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[14] See Bilodeau and Slivinski (1998), Fama and Jensen (1983), and Hansmann (1980), as to those rational hypotheses.

ready to make decision on whether to take on the role of the social entrepreneur. Therefore, it must be shown that someone comes into being as a social entrepreneur.

Furthermore, it should be noted that one social entrepreneur will often do for the organizing work. Then, we are required to not only show that a social entrepreneur is sure to come into existence but also examine what types of person is the first to become the social entrepreneur.

Bilodeau and Slivinski (1996a, 1996b) examined the hold-up problem with the voluntary provision of a public good, but they took a volunteer type of entrepreneur, whose work is rewarded only with the benefit of public goods. However, if the public good should be provided by way of a corporation type of organization set up by a social entrepreneur, the organizing work is usually too costly to be dismissed and nobody can take it on without some guarantee of pecuniary rewards for his costly work.

In this chapter, I come up with a finite-stage "waiting game" played by the $(n+1)$ members of a society from which a social entrepreneur come into being. The essential characteristics of this model are as follows: Each of the $(n+1)$ players, numbered $(0, 1, 2, \ldots, n)$, has to make decision firstly on whether he becomes a social entrepreneur, secondly on when he does, and finally on what type of organization he adopts to provide the public good on a voluntary basis. Once the process of providing the public good is started, it can continue to the final stage, denoted by T. A social entrepreneur has to collect voluntary contributions[15] to finance the cost to provide the public good, but someone of those (n+1) players has to become the entrepreneur at the beginning. Each member is distinguished by competence for the organizing work and the managing work. The whole process of providing the public good is divided into two stages, called the "organizing stage" and the "provision

[15] The voluntary provision of public goods can be financed not only by contributions but also by the "selective-incentives" schemes defined by Olson(1965). The voluntary contributions model in this paper is based on Bergstrom et al.(1986) and Andreoni (1993). As to the eco-goods model, see Ueda (2004). As to an eco-lotteries model, see Ueda and Svendsen (2002), Ueda (2002), and Nishizaki et al. (2005, 2004).

stage", in turn. Each of those two stages consists of finite constituent-stages. At the beginning of the organizing stage, the social entrepreneur must create new ideas and plans. Then, he has to persuade or enlighten other players to participate in a contributors' group aimed at providing the public good. In this process, he announces that a fixed amount is deducted from contributions collected from those players with a view to covering both his salary and other cost to provide the public good (hereafter, the deducted amounts are called the "salary", for short). Just at the end of the organizing stage or just at the beginning of the provision stage, the salary is determined through bargaining between the social entrepreneur and other players. At this point of time, he declares that in the provision stage he is subjected to the "non-distribution constraints,"[16] i.e., that the public good is provided by way of a not-for-profit organization. Then, each member determines how much he contributes in each stage of the provision stage. In the same stage, the social entrepreneur has to put his "final hands" on those contributions net of the salary in order to finalize the process of providing the public good. The final hands are a generic name representing various kinds of managing work required in the providing stage. They influence the quality and/ or quantity of the public good. If someone takes on the role of the social entrepreneur, other players are ready to contribute to the provision of the public good. If not, however, all members wait until someone takes the initiative in providing the public good. When all society members are at the initial point of the whole game, therefore, they have to decide not only on whether to become a social entrepreneur and on what type of organization to be chosen, but also on when to do.

From the analysis of the above game, the main factors crucial for answering those questions are derived. They are as follows: (a) talents and skills for the managing work, (b) those for the organizing work, (c) discount factor, and (d) salary level. These results make the personal characteristics of the best

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[16] In this chapter, I do not take into consideration the "profits in disguise" such as perks argued by Glaeser (2002) and Glaeser and Shleifer (1998), because the objective of this chapter is to derive the rational foundations of not-for-profit organizations.

candidate for the social entrepreneur much more concrete than ever. From those concrete characteristics, furthermore, we can derive educational implications on how to enlighten those talents and competences for the social entrepreneur.

In what follows, this chapter is organized as follows: In the next section, the basic assumptions are posited and some relevant concepts are defined. In the third section a constituent game in the providing stage is formulated by a game model played by the $n+1$ members of a society. A voluntary-contributions scheme is put into this constituent stage-game in which n contributors and one social entrepreneur play. Analytical results are summarized as several lemmas. In the same section, the rational foundation of the not-for-profit constraint is put forward. In the fourth section, the whole process of the voluntary contributions scheme is examined in the "waiting game" framework in discrete time, and the main results are derived. The last section concludes this chapter.

2. The Basic Assumptions and Concepts

When a public good is provided on a voluntary basis, it can be financed not only by voluntary contributions but also by means of the "selective-incentives" schemes found out by Olson (1965). As examples for the latter, we can take up firstly the scheme of "charity lotteries" designed by Morgan (2000), Ueda and Svendsen (2002), and Nishizaki et al. (2005, 2004), and secondly the scheme of "private good-cum-public good" designed by Pecorino (2001) and Ueda (2005). In this chapter, the scheme of "voluntary contributions" is presented. In the next chapter, The scheme of private good-cum-public good is introduced.

The voluntary-contributions scheme taken up in this chapter is a refined version of Bergstrom et al. (1986). It is meaningful to take up their contribution-scheme in the first, since it not only foreran many of the succeeding voluntary-provision schemes, but also foreran them in overlooking the indispensability of a social entrepreneur.

Players and Finite-Stage Game

Suppose that there is a society consisting of $(n+1)$ players, each of whom is called by number, $0, 1, 2, \ldots, n$, in turn. The players set is defined as $N = \{0,1,2, \ldots, n\}$. The whole process of providing a public good for these players consists of finite stages, the final stage of which is denoted by T. It is necessary that at least one player has to become a social entrepreneur who takes the initiative in providing the public good on a voluntary basis. The social entrepreneurship has to be shown both in the organizing stage and in the provision stage. Whilst the main tasks in the organizing stage are to create new ideas and plans for a voluntary-contribution scheme and to negotiate with other players on the scheme, those in the provision stage are to manage the process of providing the public good in an efficient way. Whilst the former stage suffers from the "incomplete-contract" problem or the hold-up problem, the latter is associated with the "principal-agent" problem. In this chapter, whilst the former problem is solved by deducting a fixed salary from collected contributions prior to supplying the public good, the latter is overcome by accepting the "not-for-profit" constraint, i.e., by adopting a "not-for-profit" organization.

The Organization Stage and the Provision Stage

It is assumed that it takes Δ stages to finalize the organizing work, and that if j player takes on the organizing work, it costs him w_j per stage in terms of the numeraire good. The organizing work is of an unverifiable nature, as well as it is costly. That is, it has to be undertaken subjected to the condition of incomplete contract. In order to overcome the hold-up problem, the social entrepreneur negotiates with the organized members to assure him of taking away a part of collected contributions as a salary. Just when the organizing work is finalized, the provision stage begins. In each constituent stage of the provision stage until the final period T, the social entrepreneur has to carry out the scheme of voluntary contributions, i.e., he has to turn the collected contributions net of his salary into financing for the public good and furthermore to put his final hands on those net-contributions to finalize the providing process. Those final hands mean the managing work carried out by

the social entrepreneur and the managing work undertaken in each constituent game of the provision stage has an influence upon the quality and/or quantity of the public good. The supply of the public good is a function of both the net-contributions and the managing work. In later section of this chapter, it is shown that though this managing work suffers from agent problem, the social entrepreneur alleviates this problem by accepting the "not-for-profit" constraints.

The Scheme of Voluntary-Contributions[17]

In each constituent game in the provision stage, each contributor makes decision of his contributions independently of other contributors' decisions[18] (the Cournot conjecture, for short) on the condition that he is conscious that his decision on the contributions influences on the managing work of the social entrepreneur. The contribution of i player is denoted by g_i. Denote by $G_j = \sum_{i \neq j}^{n} g_i$ the total gross-contributions by n players on the condition that the j player is social entrepreneur. Then, the net-contributions are defined as $(G_j - \theta)$, where θ is the salary payment to the social entrepreneur, subject to the constraint, $0 \leq \theta \leq G_j$. The social entrepreneur puts his final hands on $(G_j - \theta)$, and then, the quantity and quality level of the public good is determined in the end of each constituent stage of the provision stage. The final hands by the social entrepreneur represent the managing work, whose workload in each constituent stage is denoted by e. Skills and talents for the managing work is represented by the function of e, defined by $\varphi_j(e)$, $\varphi_j(0) = 0$, $\varphi_j'(0) > 1$, $\varphi_j'(e) > 0$, and $\varphi_j''(e) < 0$, $for\ e > 0$.

On the assumption that an increase in the quality and quantity of the public good brought about by the managing work, e, of the social entrepreneur is approximated by $\varphi_j(e)$ *en masse*, the supply function of the

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[17] See Andreoni (1993) as to the voluntary-contributions scheme with threshold, and Bergstrom et al (1986) as to the Nash Equilibrium of the voluntary provision of public goods.

[18] We do not necessarily have to assume the Cournot conjecture among the contributors. The assumption of symmetrical conjecture is also applicable to our base model.

public good is defined by Eq.(1), when the j player is social entrepreneur.

(1) $\Psi_j(G_j, e;\ \theta) = G_j - \theta + \varphi_j(e)$

Utility Functions

The preferences of all members are assumed to be a quasi-linear function[19] whose variables are the public good and a private good (hereafter, the numeraire good). If i player is a contributor-player and j is the social entrepreneur, the i player's utility, denoted by U_i, and his income constraint are defined by Eq.(2) and (3), respectively.

(2) $U_i = U_i(x_i,\ \Psi_j(G_j, e;\ \theta) = x_i + v_i(\Psi_j(G_j, e\ ;\ \theta)$
(3) $I_i = x_i + g_i$, for $i \neq j,\ for\ \forall i \in N$.

In the above, x_i is the amount of the numeraire good, and v_i is a concave function.

On the other hand, the social entrepreneur's utility and his income constraint are defined by Eq. (4) and (5), respectively, if the j player plays the role of social entrepreneur.

(4) $U_j = U_j(x_j,\ \Psi_j(G_j, e;\ \theta) = x_j + v_j(\Psi_j(G_j, e; \theta))$
(5) $I_j + \theta = x_j + e$.

In the above definitions, x_j is the numeraire goods consumed by the social entrepreneur and v_j is a concave function.

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[19] The concavity is applied to the utility of the public good. This assumption is justified by the observation that public goods provided by "not-for-profit" enterprises are not those of an urgent nature such as defense against an imminent violent threat, and furthermore, by the ubiquitous observation that actually the provision of those goods are often postponed.

3. The Provision Stage

The provision stage is a dynamic game comprised of finite constituent-games. In the first subsection of this section, the constituent-stage game is constructed and analyzed. In the second subsection, it is shown that the "not-for-profit" constraint is adopted on the basis of a rational calculus but not on a self-sacrificing behavior hypothesis. In the provision stage it is assumed that at least one social entrepreneur exists in the beginning, because without his managing work, the public good cannot be provided. Therefore, if we denote by U_j^E (by U_j^C) the utility of some j player which if he takes the role of the social entrepreneur (if he chooses to be a contributor-player), he obtains, the following relation, $U_j^E > U_j^C$, must be satisfied in order for the j player to be a social entrepreneur. In this section, it has to be assumed that there exists such a type of player in the beginning of the provision stage.

3.1 Constituent-Stage Game in the Provision Stage

At each stage in the provision stage, a constituent-stage game is played by n contributor-players and a social entrepreneur. Denoting by g_i the strategy of i contributor-player and by e the strategy of the social entrepreneur numbered j, the strategy profile is defined by (g_i, e), $s.t., 0 \leq g_i \leq I_i$, $0 \leq \mathrm{e} \leq I_j + \theta$. In what follows, it is assumed for simplicity that the second derivatives of the concave v_i, and v_j are a negative constant, and furthermore, that the second derivative of the concave function φ_j is also a *negative constant*.

The Social Entrepreneur's Decisions on the Managing Work

On the condition that the total contributions less salary, $(G_j - \theta)$, is given, the social entrepreneur determines the workload of his managing work, e, so as to maximize (4) subject to the constraint (5). If the inner solution, defined by $e^* = e^*(G_j;\ \theta)$, is assumed to exist, it satisfies Eq. (6).

(6) $e^* = e^*\big(G_j;\ \theta\big) = argmax_{\ e}\ U_j(I_j + \theta - e,\ G_j - \theta + \varphi_j(e);\ \theta, G_j)$

$$= argmax_{\ e}\{I_j + \theta - e + v_j\left(G_j - \theta + \varphi_j(e)\right)\}.$$

From the first derivative of $U_j(e)$ and the rearrangement of it, Eq.(7) is derived and e^* is determined so as to satisfy Eq. (7) which satisfy the necessary and sufficient condition of the maximization, $s.t.,\ \varphi_j' > 0,\ v_j' > 0,$ $\varphi^{"} < 0$ and $v_j^{"} < 0$.

(7) $\varphi_j'(e) \cdot v_j'\left(G_j - \theta + \varphi_j(e);\ \theta,\ \ G_j\right) = 1,$ for a given θ and G_j.

Then, by rearranging the total differential of (7), it is proved that $\partial e^*/\partial G_j$ is negative, as shown by (8).

(8) $\partial e^*/\partial G_j = \ \partial e^*/\partial g_i = \ -v_j^{"}\varphi_j'/\{v_j^{"} \cdot (\varphi_j')^2 + \ \varphi_j^{"} \cdot v_j'\} < 0.$

The negativity of the first derivative in (8) means that the best-response function of the social entrepreneur is negatively sloped.

The Contributor-Players' Decision on the Amount of their Contributions

A contributor-player i maximizes his utility (2), subjected to (3), on the condition that the social entrepreneur's decision on e is given. If the inner solution is assumed to exist and it is denoted by g_i^*, it meets Eq.(9).

(9) $g_i^* = g_i^*(e\ ;\ \theta) = \ argmax_{\ g_i}\ U_i\left(I_i - g_i,\ G_j - \theta + \varphi_j(e)\right)$

$$= argmax_{\ g_i}\{I_i - g_i + v_i\left(G_j - \theta + \varphi_j(e)\right)\}.$$

From the maximizing procedure and the rearrangement of the result, g_i^* is derived so as to satisfy Eq. (10).

(10) $v_i'(*) = v_i'\left(g_i^* + G_{j-i} - \theta + \varphi_j(e)\right) = 1,\ G_{j-i} = \ \sum_{h\neq i,j}^{n} g_h.$

In the above, $v_i'(*)$ is the value of the first derivative of v_i at the i player's optimal.

By deriving the total differential of (10), the negative relation not only

between g_i and e but also between g_i and g_h at the optimal is derived, as shown by (11) and (11)' below.

(11) $v_j^{''}(*)\{\partial g_i/\partial e + \varphi_j'(e)\} = 0$, or, $\partial g_i/\partial e = -\varphi_j'(e) < 0$
(11)' $\partial g_i/\partial g_h = \varphi_j'(e)\,\partial e/\partial g_s < 0,\ for\ \forall i,\ h \neq j.$

Both (11) and (11)' imply that not only an increase in the contribution of any contributor-player but also an increase in the managing work of the social entrepreneur, *ceteris paribus*, reduces other players' contributions to the provision of the public good.

Incidentally, if the contributor-player expects that his contributions influence on the social entrepreneur's decision on e, the maximizing condition is changed to (10)' from (10).

(10)' $1 = v_i'(**)\{1 + \varphi_j'(e) \cdot \partial e/\partial g_i\},\ \forall i \neq j$..

If $\partial e/\partial g_i < 0$, it must hold that $v_i'(**) > 1$. That is, if an increase in the contributions to the public good is expected to bring about a decrease in the managing work of the social entrepreneur, the amount of the public good provided at the optimal must be reduced to a lower level than the one provided on the condition that the contributor-player does not expect his decision on the contributions to influence upon the managing work. On the contrary, if it is expected that $\partial e/\partial g_i > 0$, it must hold that $v_i'(**) < 1$, and the public good is provided on a larger scale compared to the optimal level provided without the expectation mentioned above.

Based on the analyses of the best-response functions, it is proved that the Nash equilibrium of the constituent game exists, as shown by Lemma 1 below.

Lemma 1

The constituent game in which the scheme of voluntary contributions is

carried out has the Nash equilibrium.

Proof of the Existence of the Nash Equilibrium: The strategy set of the social entrepreneur, denoted by j player, and that of any contributor-player, denoted by i player, are both compact and convex, because $0 \leq e \leq I_j + \theta$ and $0 \leq g_i \leq I_i$. Furthermore, by the assumption, it is obvious that the preference function of the social entrepreneur is not only continuous in e, but quasi-concave in e, and that the payoff function of the i contributor-player is continuous in g_i and quasi-convex in g_i. *Q.E.D.*

The provision-stage game comprised of the finite-stage constituent games has the subgame perfect equilibrium, as is shown by Lemma 2. The proof is omitted because it is trivial.

Lemma 2

In the finitely-repeated game of the constituent-stage game, the strategy profile which consists of the repetition of the Nash equilibrium of the constituent game is obviously the subgame perfect equilibrium.

Comparative Statics: The Effects of a Parametric Change in the Salary

Let's examine the effect of the social entrepreneur's salary, θ, on the managing work, e^*, the amount of voluntary contributions, g_i^* for $i \in N, i \neq j$,and the payoffs, U_h, $\forall h \in N$, at the optimal, in turn.

Firstly, by rewriting the total differential of (7) and that of (10) respectively, subjected to each optimal constraint, Eq.(12) and E.(13) are derived.

(12) $[\varphi_j^{''} \cdot v_j' + (\varphi_j')^2 v_j^{''}]\, de^*/d\theta = -\varphi_j' \cdot v_j^{''} \cdot (\sum_{i \neq j}^{n} dg_i^*/d\theta - 1)$.
(13) $\varphi_j' \cdot de^*/d\theta = -(\sum_{i \neq j}^{n} dg_i^*/d\theta - 1),\ i \in N,\ i \neq j$.

By inserting the right side of (13) into the right side of (12) and by rearranging the result, (14) is derived in the end.

(14) $de^*/d\theta = v_j^{''} \cdot (\varphi_j')^2 / \{\varphi_j^{''} \cdot v_j' + v_j^{''} \cdot (\varphi_j')^2\} > 0$.

Inserting (14) into the right side of (13) and by rewriting the result, (15) and its corollary (15)' are derived.

(15) $\sum_{i\neq j}^{n} dg_i^*/d\theta - 1 = -v_j^{"} \cdot (\varphi_j')^3/(\varphi_j^{"} \cdot v_j' + v_j^{"} \cdot (\varphi_j')^2 < 0.$
(15)' $\sum_{i\neq j}^{n} dg_i^*/d\theta < 1.$

Next, by taking the total differential of U_j and U_i subject to (7) and (10), and by inserting (14) and (15) and by rearranging the results, (16) and (17) are derived.

(16) $dU_j/d\theta = 1 + v_j' \cdot (\sum_{i\neq j}^{n} dg_i^*/d\theta - 1) < 1$
(17) $dU_i/d\theta = (\sum_{k\neq j,i}^{n} dg_k^*/d\theta - 1) + 1/\{\varphi_j^{"} v_j'/(v_j^{"} \cdot (\varphi_j')^3) + v_j'\}.$

An analytical result is derived from (16) and (17), if taking it into consideration that whilst the second term on the right side of (16) is negative, the first (second) term on the right side of (17) is negative (positive). It is that the larger v_j' is, i.e., the smaller $\varphi_j(e^*)$ is, then, the smaller both $dU_j/d\theta$ and $dU_i/d\theta$ are. On the condition that the competences for the managing work, approximated by the functional form of $\varphi_j(e)$ are given, this result implies that if an increase in the salary of the social entrepreneur whose evaluation of the public good increases more gradually brings about, if positive, an increase in the utility not only of the social entrepreneur but also of any contributor-player on a larger scale, and *vice versa.* However, the increase of the social entrepreneur's utility cannot reach the increase in the social entrepreneur' salary, because the total contributions do not increase so much as to set off against the increase in the salary. On the contrary, on the condition that the evaluation function, v_j, is given, the above result implies that if an increase in the salary of the social entrepreneur who are more competent for the managing work brings about, if positive, an increase in the utility not only of the social entrepreneur but also of any contributor-player on a larger scale, and *vice versa.*

3.2 The Rational "Not-for-Profit" Constraint

The "not-for-profit" constraint is usually adopted by the social entrepreneur who intends to provide a public good by the means of voluntary schemes for financing the cost of providing the public good. Why is the not-for-profit organizational form preferred to the "for-profit" one? It is because the social entrepreneur can gain larger utility under the former organizational form than under the latter one. In this sense, the not-for-profit constraint has the rational foundation and is based on a self-interested calculus. In order to support the logic of the rational "not-for-profit" constraint, in this subsection, the social entrepreneur's behaviors deviating from the not-for-profit constraint and the contributor-players' responses are examined in a general dynamic setting. The main propositions are summarized as Lemma 3.

Lemma 3: The Rational Foundation of the "Not-for-Profit" Organization

As long as a deteriorated change in the quality or quantity of a public good is perceived by any contributor-player as a deviation from the voluntary scheme carried out under the not-for-profit constraint on the assumption that the provision stage consists of sufficiently many stages, the discount factor is large enough and/or the benefit obtainable from the provision of the public good is large enough relatively to the existing income, the trigger strategy motivates the social entrepreneur to stick to the not-for-profit constraint, based on a rational calculus.

Proof: If the social entrepreneur makes the contract that the scheme of voluntary contributions devised in the previous subsection is carried out subjected to the not-for-profit constraint, he is obliged *by law* to put any net-proceeds obtainable from the scheme only into the scheme's objectives. If he honestly complies with the not-for-profit constraint[20] on the condition that

[20] This assumption may appear optimistic. As Glaeser (2002) pointed out, the manager of a not-for-profit firm can actually appropriate the net-proceeds in various disguises such as perks. But the purpose of this sub-section is to prove that even without such perks or non-compliance action, his utility becomes larger under the not-for-profit constraint than under no constraints.

any contributor-player becomes aware of a deteriorated change in the quality or quantity of the public good, the unique Nash strategy set of the constituent supply game, defined as $\left(e^*(\theta), g^*_{-j}(\theta)\right)$, $g^*_{-j} \equiv \left(g^*_0, g^*_1, \dots, g^*_{j-1}, g^*_{j+1}, \dots, g^*_n\right)$ for a given θ, is repeatedly carried out from a beginning stage, denoted by s, from which the provision stage starts, until the final stage, T. Then, the net increase in his payoff amounts to $\sum_{t=0}^{T-s} \lambda^t \left\{U_j^* - I_j\right\}$, where the net payoff of each stage is discounted to the s stage of the whole game consisting of the organizing stage and the provision state. On the condition that an increase in θ brings about an increase in U_j^*, let's define U_j^{max} as follow:$U_j^{max} = I_j + \theta^{max} - \varphi_j(e) + v_j\left(G_j - \theta^{max} + \varphi_j(e)\right)$, $\theta^{max} = argmax_{\ \theta}\ U_j\left(e, G_j : \theta\right)$, $s.t., 0 \le \theta \le G_j$. Then, $U_j^{max} \ge U_j^*(\theta)$ for some θ.This inequality condition is logically necessary in order for the deviation from the Nash equilibrium of the constituent game to work as a short-run incentive. If the social entrepreneur's deviation at a h stge is responded by the trigger strategy of the contributor-players beginning from the next $(h+1)$ stage and ending at the final stage, the social entrepreneur is sure to loose $\sum_{t=h+1}^{T} \lambda^{t-1}\left(U_j^*(\theta) - I_j\right)$ in return for the once-for-all gain, $U_j^{max} - U_j^*(\theta)$, at the h stage. In order for the trigger strategy to work as a punishment, the inequality relation, $\sum_{t=h+1}^{T} \lambda^{t-1}\left(U_j^*(\theta) - I_j\right) > \lambda^{h-1}\{U_j^{max} - U_j^*(\theta)\}$, is required to hold. This inequality condition is satisfied as long as the provision stage consists of sufficiently many stages, his discount factor is large enough and/or the benefit obtainable from the provision of the public good is large enough. On those assumptions, it is rational for the self-interested social entrepreneur to stick to the not-for-profit constraint. Q.E.D.

Since the trigger strategy meets the condition of the Nash equilibrium, any player has no incentive to deviate from the behaviors specified by the strategy profile mentioned in the above lemma, once the first constituent game is begun with cooperative behavior-strategy.

The logic of the "rational not-for-profit constraint" is critical of the conventional view of the not-for-profit organizations. According to the

conventional concepts, the not-for-profit organizational form should be based on an altruistic basis and is an ideal organizational form for realizing collective interests on a voluntary basis. Such an image of the not-for-profit organizations has been discouraging many candidates for the social entrepreneur from developing the skills and competences required for business entrepreneurship mentioned above. In this subsection, I supported the proposition of the rational "not-for-profit" constrain that the not-for-profit constraint is an institutional solution to the distrust problem called the "principal-agent" problem from which it is inevitable for principal-contributors to suffer and it is worked out for the sake of the social entrepreneur's self-interests.

If the net-benefits obtainable from the public good cannot serve as so sufficient incentives as to motivate any candidate for the social entrepreneur to take the initiative in providing a public good by the scheme of voluntary contributions, other incentives such as pecuniary incomes are required to motivate them. Those incentives have to be paid out from the voluntary contributions he collects. Then, the scheme of voluntary contributions is inevitably involved in the principal-agent problem in the sense that those contributor-players fear that those contributions paid out by them on a voluntary basis may be appropriated by the social entrepreneur. Without getting rid of such distrust booted up by such a fear, the social entrepreneur cannot get to their final goal of providing the public good. The social entrepreneur solves this principal-agent problem by appealing to the not-for-profit constraint. Lemma 3 shows that as long as the assumptions of Lemma 3 are met, in general, the not-for-profit constraint has a rational basis.

The Merits of the Social Entrepreneur

It is obvious that the social entrepreneur can meet the participation constraint more easily than a "for-profit" entrepreneur and political entrepreneur, because, according to the archetypical concepts, the latter two types of entrepreneurs obtain no benefit from the public good. Therefore, they are required to be rewarded only with pecuniary revenues or non-public goods.

It requires for larger incentives to motivate those types of entrepreneurs to take the initiative in providing a public good. It is easy to prove those propositions in the analytical framework of this section, as shown below.

A simple form of the utility functions of those two types of entrepreneurs other than the social entrepreneur is defined by the following equation: $U_j = U_j(e, G_j : \theta) = I_j + \theta - e \geq 0,\ s.t.,\ 0 \leq \theta \leq G_j$. It is trivial to prove that the maximized utility is achieved, if the managing work, e, is set at zero and the salary level is set at G_j. Then, the utility of any i contributor-player gets down to $U_i = U_i(e, G_j : \theta) = I_i - g_i + v_i\left(G_j - \theta + \varphi_j(0)\right) = I_i - g_i,\ s.t.,\ G_j = \theta,\ \varphi_j(0) = 0$, and $v_j(0) = 0$. This is the worst scenario for any voluntary contributor. If a self-proclaimed social entrepreneur is actually an archetypical "for-profit" entrepreneur characterized with the above utility function, the worst scenario is most likely to become a reality. Actually, the deceitful maneuvers of such a self-claimed social entrepreneur are easily found out in the end, even if many of the agent problem associated with the scheme of voluntary contributions originate in those deceits.

4. The Whole Process of the Scheme of Voluntary Contributions

According to the analytical framework of this chapter, the whole process of the voluntary contribution scheme is divided to the organizing stage and the provision one. In this section, the organizing stage is examined in the second subsection after the provision stage as a whole is reexamined. Since any candidate for the social entrepreneur has to bear the burden of the organizing work before the provision stage, his payoff of the constituent game played in the provision stage, U_j^E, must be assured to be large enough relative to his burden of the organizing work, denoted by A_j and w_j. Whilst A_j approximates the workload to create new schemes and to plan how to carry it out, w_j means the workload to negotiate with other players in each stage of the organizing process for the sake of talking them into going along with his plan.

4.1. The Whole Process of the Provision Stage

If j player plays the role of the social entrepreneur, he has to begin carrying out the managing work just after the organizing stage is cleared. As shown in the third section, the strategy profile,(e^*, g^*_{-j}), is the equilibrium of each constituent supply-game in the provision stage. Furthermore, the strategy profile of the whole provision game, which assigns the strategy profile, (e^*, g^*_{-j}), to each constituent supply-game until the final stage T, can be achieved by the trigger strategy of the provision stage game on the condition that the social entrepreneur is subjected to the not-for-profit constraint. The logic of rational "not-for-profit" organizations can become more robust by showing that the trigger strategy can be adopted.

Suppose that the process of providing the public good starts from s stage. If the equilibrium payoff to the social entrepreneur ($j$player) which is gained in the provision game as a whole and the one to the contributor-player (i player) gained in the same game are denoted by $E_j(s)$ and $F_i(s)$, respectively, they are defined by (18) and (19), in turn.

(18) $E_j(s) = \sum_{t=s}^{T} \lambda^{t-1} U_j(\theta)$.
(19) $F_i(s) = \sum_{t=s}^{T} \lambda^{t-1} U_i(\theta)$.

In the above two definitions, the right side of each equation is discounted to the first stage in the whole game comprised of the organizing stage and the provision stage, and $U_j(\theta)$ and $U_i(\theta)$ mean the payoff of the j player and that of the i player, respectively, both of which are realized by playing the Nash equilibrium of the constituent-stage game for a given θ.

Since the provision game as a whole is assumed to be played by one social entrepreneur denoted by j player and other n players represented generically by i player, it is taken for granted that at least one player prefers being a social entrepreneur to being a contributor-player. Of course, it is not enough to assume that some of the players prefer taking on the managing work in order to assure the existence of a social entrepreneur in the beginning of the provision stage. It is because, before those candidates for social

entrepreneur determine whether to become a social entrepreneur, they have to count in the organizing work under the condition of incomplete contract. Therefore, at the beginning of the organizing stage, the organizing work is taken into consideration as the crucial cost factor which influences on those candidates' decisions of whether to become a social entrepreneur.

4.2 The Organizing Stage: the First Stage in the Waiting Game

In the organizing stage, if the j player becomes social entrepreneur, he has to take on the organizing work, the workload of which is denoted by C_j. If the organizing work is counted in, the total net-payoff to the j player of the waiting game may be larger or smaller than the total net-payoff to him which is obtained if he is a contributor-player. Even if the former payoff is smaller than the latter one, it may be better for him to become a social entrepreneur as soon as possible than to wait until a critical stage in which what the status quo brings about to him is the worst. On the other hand, even if all players are ready to share the direct cost to supply a public good in the provision stage, quite often they do not want to take on the organizing work indispensable for the voluntary contributions scheme, but they want someone else to do it. It is because the organizing work is too costly to take it on in the first, even if the managing work is not so costly. In such a setting, all people are motivated to free-ride on someone's taking the initiative in organizing other members into a cooperative network. Unless anybody takes on the organizing work, no public good is provided and the status quo continues until the critical stage where all fall into the worst result. If players play in such a dynamic setting, the play is formalized by the waiting game.

In what follows, the organizing stage is set up as the first stage of the waiting game, and then, it is combined with the provision stage by the backward induction.

The waiting game in a discrete time[1]has to meet the following conditions: (i) that every member wants someone else to take on the organizing work rather than he himself does it, (ii) that if he has to take it on, then the sooner, the better, and (iii) that it is worse to share the organizing work with other player

than to free-ride on other's work. In the waiting game setting, accordingly, the problem is not only "who" but also "when" the player stands up in the first for taking the initiative.

The Assumptions and Definitions

Prior to the provision stage, any player who plays the role of social entrepreneur has to create an idea of the voluntary-contributions scheme, make a plan to carry it out and communicate with other n players to induce them to participate in the scheme. These ex ante works are called the "organizing work" *en masse*.

For simplicity, it is assumed that the organizing work is divided into the following two parts: The first part is composed of the workload to create and make a plan to carry it out at the beginning. The workload of this first part is denoted by $A_j, j \in N$. On the other hand, the second part is composed of the workload to negotiate with other players with a view to talking them into going along the designed scheme.

Furthermore, it assumed that it takes $(\Delta + 1)$ stages to finalize the organizing process and the j player has to spend the w_j amount of the workload per stage during Δ stages. Δ is assumed as a constant parameter as well as A_j and w_j. Differences in the skills, competence and/or talents for the organizing work among the players are approximated by difference in both A_j and w_j, $j \in N$. When the organizing work is begun by j player in $\exists t$ stage, the total workload he has to bear in order to finalize the organizing process is defined by (20) on the assumption that the first part of the organizing work is undertaken at the beginning of the organizing stage.

$$(20)\ C_j(t) = \lambda_j^{t-1} A_j + \sum_{h=t}^{t+\Delta} \lambda_j^{h-1} w_j = \lambda_j^{t-1}\left(A_j + w_j \frac{1-\lambda_j^{\Delta+1}}{1-\lambda_j}\right)$$

Denoting by $\Pi_j^E(t)$ the total net-payoff which the j player can gain by playing the role of the social entrepreneur at the t stage in the waiting game, it is defined by (21).

$$(21)\ \Pi_j^E(t) = E_j(t+\Delta+1) - C_j(t) = \sum_{s=t+\Delta+1}^{T} \lambda_j^{s-1} U_j(\theta) - C_j(t).$$

On the other hand, denoting by $\Pi_i^C(t)$ the total net-payoff that if the i player is a contributor-player, she can gain on the condition that some other player begins the organizing work at the stage t before she takes on the organizing work, it is defined by (22).

(22) $\Pi_i^C(t) = F_i(t+\Delta+1) = \sum_{s=t+\Delta+1}^{T} \lambda_i^{s-1} U_i(\theta) = U_i(\theta)\lambda_i^{t+\Delta} \frac{1-\lambda_i^{T-t-\Delta}}{1-\lambda_i}$

The Conditions of the Waiting Game in Discrete Time

In the terms of this section, the definite conditions of the waiting game are defined by (C-1), (C-2), and (C-3), below.

(C-1) $\Pi_j^C(t+1) \geq \Pi_j^E(t),\ t \geq 1,\ t+1 < T,$
(C-2) $\Pi_j^E(t) \geq \Pi_j^E(t+1),\ t \geq 1,\ t+1 < T,$ and
(C-3) $\Pi_j^C(t) \geq \tilde{\Pi_j}(t),\ t \geq 1,\ t < T.$

$\tilde{\Pi_j}(t)$ in the third condition above mentioned means the total net-payoff to the j player which, if some other player begins sharing the organizing work with him at the t stage, he can gain. It is called the "tie-payoff."

The first condition (C-1) means that the payoff of any contributor-player, which is realized at the $(t+\Delta+1)$ stage later onward, is larger than the payoff of the social entrepreneur. In the introduction of the third section, it was noted that the relation, $U_j^E(\theta) > U_j^C(\theta)$ for some j, must be satisfied, where U_j^E (U_j^C) is the payoff to the j player which if he is social entrepreneur (contributor-player) in the constituent provision game, he can gain in each constituent-stage game in the provision stage. Therefore, the first condition requires that $C_j(t)$ is so large enough as to satisfy the following relation, $\Pi_j^E(t) \leq \Pi_j^C(t+1)$.

The second condition (C-2) means that if a player chooses to become social entrepreneur, then the sooner, the better for him. This condition is satisfied as long as the net-benefit obtainable from the public good is large enough relatively to the workload of the organizing work. If $\Pi_j^E(t)$ is substituted by its definition (21), the second condition is redefined by the inequality (C-2)'.

(C-2)' $\Pi_j^E(t) - \Pi_j^E(t+1) = \lambda_j^{t+\Delta}\{U_j^E - (\lambda_j^{-(\Delta+1)} - 1)w_j - \lambda_j^{t-1}(1-\lambda_j)A_j > 0$.

The above inequality is satisfied, if as was noted in the introduction of this section, U_j^E is sufficiently large relatively to A_j and w_j on the condition that the discount factor, λ_j, is not so small, *s.t.,* $0 < \lambda_j < 1$.

The third condition means that the payoff gained in a tie is smaller than the payoff gained by waiting. Even if the payoff in the tie is larger than the payoff which, if only one player takes on the social entrepreneurship, he can gain, this condition is justified to the extent that the positive effect of sharing the organizing work on the payoff gained in the tying is not so large as to surpass the effect of (C-3).

Therefore, on the condition that those three conditions are satisfied, the whole process of providing the public good by the means of the voluntary contributions scheme can be formulated by the waiting game.

4.3 The Analytical Results of the Waiting Game: the Basic Propositions

In this subsection, the main theorems, particularly, Theorem 6.1 and Theorem 6.2, of Hendricks and Wilson (1985) are applied to the waiting game set up in the previous paragraphs. Whilst skills, competences and talents for the social entrepreneur are approximated by $w_j, \varphi_j,$ and A_j, the personalities of the social entrepreneur are by v_j and λ_j.

Define τ_j as the earliest stage when the decreasing $\Pi_j^E(t)$ becomes negative, i.e., $\tau_j = \min t;\ \Pi_j^E(t) < 0,\ j \in N$. It is called the "first intolerable stage." Then, it is derived that $\tau_j \leq T - (\Delta + 1) < T$. This inequality holds, because the public good can be provided only after the organizing work which it takes $(\Delta + 1)$ stages to finalize and because all players are assumed to be candidate for the social entrepreneur. Then, without loss of generality, all $(n+1)$ are renumbered in order of $\tau_j,\ j \in N$ such that $\tau_0 \geq \tau_1 \geq \tau_2 \geq \cdots \geq \tau_n$. The meaning of τ_j is interpreted as follows: If the organizing work should be undertaken, the j player had better take on the organizing work before the stage τ_j conditional on no one having taken on the organizing work yet, but

from that period onward, he had better wait until the final stage T. Thus, it is an approximate means to measure the j player's patience to take the initiative in providing the public good by the means of the voluntary contributions scheme, conditional on any others having not yet done it. In what follows, we examine relation between τ_j and the personal requisites for the social entrepreneur, approximated by w_j, φ_j, A_j, v_j and λ_j, mentioned above.

As a preliminary, we prove the existence of the subgame-perfect equilibrium of the waiting game. It is given by Lemma 4 below.

Lemma 4

If $\Pi_0^E(1) \geq 0$, the strategy profile in which the strategy of the 0 player encourages him to start taking the initiative in providing the public good in the first at the first stage has the subgame perfect equilibrium of the waiting game.

Proof:

The sufficient condition of the above lemma, $\Pi_0^E(1) \geq 0$, is satisfied, because $\Pi_j^E(t)$ is a decreasing function of t, and $\tau_j < T, j \in N$. Then, Theorem 6.2 of Hendricks and Wilson (1985) assures the proposition of this lemma. *Q.E.D.*

The above lemma insists that there is the subgame perfect equilibrium in which the most patient player stands up in the first at the beginning stage to take the lead in providing the public good by the means of the voluntary contributions scheme.

Next, let's examine the personal characteristics of this most impatient player. For this purpose, insert (20) into (21), and then we obtain Eq.(23).

(23) $\Pi_j^E(t) = U_j^E(\theta)\left(\lambda_j^{t+\Delta} + \lambda_j^{t+\Delta+1} + \cdots + \lambda_j^{T-1}\right) - w_j\left(\lambda_j^{t-1} + \lambda_j^t + \cdots + \lambda_j^{t+\Delta-1}\right) - A_j\lambda_j^{t-1}$.

Then, from Eq.(23) and the definition of $U_j^E(\theta)$,we can derive the personal characteristics of the best candidate for the social entrepreneur. The results are summarized by Lemma 5, below.

Lemma 5

The more competent for the managing work approximated by φ_j, for the organizing work approximated by w_j and by A_j he is, furthermore, the higher valuation on future approximated by λ_j and the higher evaluation of the public good approximated by v_j he has, and finally the higher salary denoted by θ he gains, then, the higher τ_j becomes.

Proof

In what follows, it is proved only that $\partial\tau_j/\partial\lambda_j > 0$, because it is easy to prove the other parts of Lemma 5. By differentiating (23) with respect to λ_j, Eq.(24) and an inequality relation are derived, below.

$$
\begin{aligned}
(24)\ \partial\Pi_j^E(t)/\partial\lambda_j &= U_j^E\{(t+\Delta)\lambda_j^{t+\Delta-1} + \cdots + (T-1)\lambda_j^{T-2}\} \\
&\quad -w_j\{(t-1)\lambda_j^{t-2} + \cdots + (t+\Delta-1)\lambda_j^{t+\Delta-2}\} - A_j(t-1)\lambda_j^{t-2} \\
&> (t+\Delta)\lambda_j U_j^E\{\lambda_j^{t+\Delta-1} + \lambda_j^{t+\Delta} + \cdots + \lambda_j^{T-2}\} \\
&\quad -(t+\Delta)\lambda_j w_j\{\lambda_j^{t-2} + \cdots + \lambda_j^{t+\Delta-2}\} - (t+\Delta)\lambda_j A_j\lambda_j^{t-2} \\
&= (t+\Delta)\Pi_j^E(t) > 0.
\end{aligned}
$$

Thus, it is obvious that an increase in $\lambda_j$brings about an increase in τ_j. *Q.E.D.*

From Lemma 5 we derive the general proposition on the personal requisites for the social entrepreneur as following: that the player with the best mix of those personal characteristics is the first to take the lead in providing the public good by means of the voluntary-contributions scheme. The best mix determines, ceteris paribus, the highest among the first intolerable stages. For convenience, it was denoted by τ_0 in the previous paragraphs. Furthermore, it is increased by an increase in the parameters approximating the personal requisites for the social entrepreneur, just as shown by Lemma 5. The player with the highest among the "first intolerable stages" is the person

who, due to the largeness of the payoff obtainable from the voluntary-contributions scheme, can be ready to stand up as the social entrepreneur in longer periods than other persons.

5.Concluding Remarks

Entrepreneurship is indispensable for achieving any collective interest, and the social entrepreneur is the key player who takes it on in the non-market arenas where public goods are provided on a voluntary basis. The work of the social entrepreneur is mainly comprised of the organizing work and the managing work. In accordance with this classification, I divided the whole process of providing a public good by the means of the voluntary contributions scheme into the organizing stage and the provision stage. However, whilst the organizing work is faced with the incomplete-contract problem or the hold-up problem, the managing work suffers from the principal-agent problem. The business entrepreneur — "for profit" entrepreneur — and the political entrepreneur are an institutional response to the incomplete-contract problem arising in the arena of for-profit-business and in the one of rent-seeking politics, respectively. Both of those traditional solutions have been called the "residual claimers" solution. On the other hand, the principal-agent problem has been challenged by the incentives-contract approaches. From those approaches, in this chapter, I took up the not-for-profit constraint and supported the argument for its rational foundation.

The traditional concept of political entrepreneur is a justifiable metaphor of "for-profit-business" entrepreneur, in the sense that the former pursues selfishly "political profits" such as privileged benefits and status as his residual claims, just like the latter pursues monetary profits as its own residual claims. However, both of those traditional concepts presuppose either that those entrepreneurs of any type gain no benefit from the common interests (public goods) they are achieving (providing for). Therefore, unless some other residual-claims on a par with pecuniary revenues can be devised,

those traditional entrepreneurs cannot find out any solution to the question, "who takes on the costly entrepreneurship?" In the end, the logic of "free-riding on someone's initiatives" is reinforced.

In general, the social entrepreneur gains benefits not only from pecuniary revenues but also from the common interests (public goods) he is achieving (providing for). If, therefore, he can secure more benefits from the common interests or public goods, he prefers spending more of his resources on the common interests or public goods even at the cost of pecuniary revenues. His costly works, though not all, can be rewarded with or compensated with the benefits obtainable from the common interests or public goods. If so, the participation constraints on the pecuniary revenues become looser, and thus the social entrepreneur can increase other society members' benefits, compared with other two types of entrepreneurs mentioned above. However, the organizing work is quite often so costly and is so of an incomplete nature as to discourage many of society members to take it on. In order to overcome such an incentive problem and an asymmetric information problem, the social entrepreneur has to be able to design and undertake appropriate contract-schemes so as to be able to reward for or compensate for the costly work. In this chapter, I took up the voluntary-contribution scheme which allows the social entrepreneur to take away a part of collected contributions as his salary.

Next, we are faced with the following question: "what type of the society members stands up in the first as the social entrepreneurship?" or "what kinds of personal requisites does the best candidate for the social entrepreneur have?" From the analysis of the waiting game describing the process of providing a public good by means of the voluntary-contributions scheme, I derived the personal requisites of the player who stands up in the first as the social entrepreneur. To sum up, they are as follows: The society member characterized with the best mix of (1) higher competence and/or talents for the organizing work, (2) higher efficiency at the managing work, (3) higher valuation on future, and (4) negotiating skills for fixing his salary, is likely to be the first to take the initiative in providing the public good by the means of voluntary contributions scheme.

If those requisites for the social entrepreneur are a common knowledge, we can carry out social or educational projects for bringing up social entrepreneurs. According to the analytical results of this paper, they should be enlightened so as to be talented mainly (i) for sympathy with collective interests, (ii) for talents and competence for the organizing work and managing work, and (iii) future-oriented preference. The first talent is required for the social entrepreneur to have preference for collective interests. The second requirement is obvious, but the talents for the organizing work must be emphasized. The third talent is required, because the social entrepreneur has to be able to take into consideration as long-run effects as possible, in particular, when he is concerned with ecology or sustainability problems.

Chapter 3
An "Eco-Good" Business Model of the Private Provision of Public Good : A Voluntary Scheme of Private Good-cum-Public Good

In this chapter, the by-product theory of collective action is re-founded by taking it into consideration that the social entrepreneur plays a key role in undertaking any selective-incentives scheme aimed at providing a public good. As an example for the selective-incentive scheme, a business enterprise called "private good-cum-pubic good" (hereafter, "eco-good", for convenience) is taken up. The social entrepreneur's roles indispensable for providing the eco-good are formulated in the analytical framework of a waiting game and that of a race game, depending on a difference in the eco-good market, and then, conditions for the social entrepreneur to take the initiatives in organizing collective action by way of undertaking the eco-good enterprise are derived in each analytical framework mentioned above. The main results are that players with (1) high skills and talents for social entrepreneurship, (2) high discount factor and (3) some *ex ante* human capitals or assets, is the first to play the role of the social entrepreneur. Examples for the base models are taken from a socio-economic network among local communities locating along river-sides areas ranging over a main-river's fountainhead to downstream.

1. Introduction

Let's begin with an example observable in Japan. It is a socio-economic network which was formed with a view to preserving mountain forests with various ecological functions. Such a socio-economic network is a modern form of the socio-economic networks the earliest one of which can be traced back to the ancient era in Japanese history. Most of the local communities in the Japanese Archipelagos are located along rivers flowing from the mountain forests in the upstream area into the coast areas in the down-stream. Each community is located in the river-side areas of the upper-stream to the down-stream through the middle-one, all of which are connected with a main river collecting its water sources from many branch-rivers. Roughly speaking,

natural common-pools along a river are comprised of the mountain forests in the upper area, the paddy fields in the middle, the coast in the downstream area. Urban areas are usually located in the middle stream to the down-stream area. Above all, the mountain forests are common-pools vital for the survival of all industries and inhabitants in all of the river-sides areas mentioned above. It is a common sense that those forests are the fountainhead of river water, underground water and irrigation ponds. Those mountain forests have also an influence upon fishing industries through affecting the plankton composition of the coast water. Before the Second World War, those forests were well taken care of, because forests industries in those days could be self-dependent, thanks to the existence of regular market demands for various products brought about from the mountain forests. Demands for construction materials, furniture, timber for fuel and charcoal are some examples of those demands. After the Second War, however, those regular demands have been drastically shrunk not only due to an energy shift to oil but also due to loss in an international competition, so that those forests have been left unmanaged in spite of being planted under a subsidizing policy and the ecological environment of the mountain forests are in a state of crisis.

Many of the inhabitants in the middle-stream to the down-stream area are conscious of the externalities of those forests, and if more enlightened, they can easily acknowledge that they are beneficiaries of those mountain forests in the upstream-areas. They get ready to pay something for various kinds of benefits obtainable from those mountain forests. With such a social backdrop, many "not-for-profit" organizations are being set up with the aim of preserving the mountain forests. Most of them directly appeal to voluntary activities and voluntary contributions without taking it into serious consideration that not only various benefits obtainable from the mountain forests but also the organizing work indispensable for undertaking those voluntary schemes are of a public-good nature, so that the actualized level of forests-preservation is far from the goal.

Recently, a part of those not-for-profit organizations are trying to undertake various "eco-goods" enterprises whose net-proceeds are earmarked for financing the cost of preserving the mountain forests. They did not learn

about the "by-product theory of collective action", but are actually applying it to the purpose of achieving their common interests. One example of the application is that an entrepreneur type of organizers takes the initiative in undertaking those eco-good enterprises. Actually, without their entrepreneurship it is impossible to realize any collective interest or to provide any public good by means of the eco-good scheme. They are neither a volunteer type of organizer whose archetypical one is conceptually motivated only by passions or missions, because they are not sufficiently rewarded only with collective interests, nor a political and business entrepreneur type the archetypical one of whom is motivated only by pecuniary incomes, because they also rewarded with achieving their common interests. They are called the "social entrepreneur." Compared with pecuniary incomes gained by the political or business entrepreneur, those gained by the social entrepreneur are not so large as to be able to compensate or reward for their costly works but they are coming out from the society to which they belong.

Such a new observation does not necessarily mean, however, that any society-member is willing or able to become the social entrepreneur. Not only missions or passions but also talents and skills for the social entrepreneur are the personal requisites and characteristics which are observed in those social entrepreneurs in common. They are required to work out and carry out a selective-incentives scheme called the eco-good scheme. In undertaking it, they have to organize other members of the society and to overcome both the incomplete-contract problem and the agent problem arising in undertaking the eco-good scheme. In terms of the conventional usage, undertaking such a scheme may be explained by the concept called the "creative response" to new social environments (Schumpeter, 1947), where the "creative change" is brought about by the introduction of new goods and/or new organizations (Schumpeter, 1934). Even if, however, such a creative enterprise is successful, the "entrepreneurial profit" and "quasi-rents" are not assured as a sufficient reward for risky works. Never the less, risk-taking social entrepreneurs are observable. Why? It is because the traditional theory of the entrepreneur has been focusing on the for-profit business and the rent-seeking politics in whose arenas the residual-claimers' solution can be applied to overcoming the

hold-up problem. It is examined in the analytical framework of the race game.

On the other hand, in organizing collective action aimed at achieving the common interest of a large group, not only the common interest but also the organizing work is of a public good nature in the sense that they suffer from the free-rider problem. Therefore, the collective action to achieve the common interest of an above mentioned type cannot be undertaken on the same incentive-condition as the for-profit and for-rents enterprises, and must be examined in the analytical framework of the waiting game. Furthermore, if we take it into allowance that it is enough to form a network at an ex ante stage to organizing the collective action, one organizer will do for leading the collective action. Therefore, we are faced with the following questions: "what type of person is the first to stand up as the social entrepreneur," as well as "what type of person becomes the social entrepreneur."

According to the "by-product theory of collective action" (Olson, 1965), a common interest for large group is achieved only as the by-product of some private good. As emphasized up till now, in order to organize the collective action, some entrepreneurship is indispensable, and someone has to take it on but its costly aspects have been overlooked so long in the traditional literature. Summing up again, the main tasks of the social entrepreneur are comprised of (i) the "organizing work" at some preliminary stage and (ii) the "managing work" at provision stage. The former work must be done subjected to the incomplete-contract constraint, and therefore, it is faced with the hold-up problem and therefore, it is not inevitable for an entrepreneur type of organizers to come into existence in any circumstance and the conditions for such an entrepreneur to come into existence mast be examined. On the other hand, the political entrepreneurs in "for- political profits" arenas and the business entrepreneurs in "for-business profits" arenas are motivated to undertake their enterprises by the scheme of residual-claimers' solution to that hold-up problem.[21] Furthermore, a volunteer type of entrepreneur has

[21] See Wagner (1966) and Frolich et al (1971) as to the original concept of the political entrepreneurship, and on the other hand, as to the original concept of the for-profit entrepreneur, see Alchian and Demsetz (1972).

been considered as a solution to the hold-up problem with the organizing work, and the agent problem with the managing work is solved by the rational "not-for-profit" constraint.

The above concepts of entrepreneur and those of contract problem, however, are implicitly based on some extreme polar types of preference functions. For example, the preferences of political entrepreneurs and those of for-profit entrepreneurs are implicitly assumed to be a function of pecuniary revenues or something on a par with such a pecuniary payoff. Collective interests realized by their entrepreneurship are thought little of. By contrast, the preferences of volunteers are usually supposed to be a function of the collective goods or missions-values exclusive of pecuniary rewards. Generally speaking, however, those entrepreneurs of a volunteer type who take on the tasks required for collective action may well enhance their utilities not only by mission-values they are realizing but also by pecuniary rewards. The s*ocial entrepreneur*[22] is defined as the entrepreneur with such a general type of preference function as well as with skills and talents for the social entrepreneurship. Then, the two traditional types of entrepreneurs can be subsumed in the entrepreneur in general, and is considered as its two polar extreme-cases.

If the social entrepreneur is counted in as the key player of collective action, it may be expected that he can alleviate the seriousness of both the hold-up problem and agent problem arising in the collective action. For example, since the agent problem with the managing work is caused by principals' distrust or mistrust of his honesty in management, it may be, if not fully, alleviated by the appeal to so-called "not-for-profit" or "non-distribution" constraints. Here, the not-for-profit constraints are recognized as a rational institutional scheme for allaying the principals' fear that their contributions and payments may be appropriated. Likewise, the social entrepreneur may solve the hold-up problem with the organizing work, since there comes out a possibility that if

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[22] Bilodeau and Slivinski (1998), Fama and Jensen (1983), and Hansmann (1980) define the managers of "not-for-profit" firm as a social entrepreneur type, without giving an explicit definition of the social entrepreneur.

he is a social entrepreneur, he can work out and carry out those selective-incentives schemes which can assure a reward for the organizing work done subjected to the condition of an incomplete contract. The eco-good enterprise is one of those selective-incentive schemes. The solvability of those problems becomes higher if the social entrepreneur is counted in than otherwise where only the political or business entrepreneurs are assumed to exist. It is because the social entrepreneur may be able to lower the pecuniary threshold of entering into collective action more easily, due to his preference function according to which for the costly organizing and managing work, he is rewarded or compensated not only with pecuniary revenues but also with the collective interests.

Finally but the least, we have to examine one more problem, if the social entrepreneur is acknowledged as the key player in undertaking the eco-good scheme. This problem arises, if the eco-good enterprise is sufficiently lucrative on the condition that it is undertaken in a monopoly and therefore if more than one candidate for the social entrepreneur competes for the monopoly. Then, have to solve the following question: who is the first to win a monopolistic position of the social entrepreneur in such a profitable eco-good enterprise, as well as the question: who are willing to become the social entrepreneur. As well as the second question, the first question must be answered, if the incomplete-contract problem is solved by undertaken the eco-good scheme on the condition that it is sufficiently profitable and furthermore, on the condition that one firm or one social entrepreneur will for the purpose of the eco-good enterprise. Taking it into allowance that more than one million beneficiaries are living in the river-sides of a main river, those two conditions may be met by the socio-economic network formed along a main river taken as an example in the beginning of this introduction, if the eco-good scheme is applicable to it. The first question above-mentioned, "who is the first," is answered in the analytical framework of the race game, as applied to the power struggle in the first part of this book.

In order to solve those problems arising in undertaking the eco-good scheme, we have to start from the situation where all members of a society can be candidates for the social entrepreneur in spite of their relative competences

and talents for the entrepreneurship being an open question. The answers depend on whether the candidates for the social entrepreneur play in the race game or in the waiting game. In the former game, more than one candidate comes on the stage and they vie for a monopoly. In the latter game, all candidates are patient to stand up in the first and want someone else to take the initiative in undertaking the eco-good scheme.

In this chapter, I come up with the above two types of game models with a view to examining the whole process of achieving the collective interests of a society by means of the eco-good scheme, and derive the main factors crucial for answering the following two questions: "what type of person is the first to become the social entrepreneur" and "what type of person is likely to become the social entrepreneur." By analyzing each game model, we can derive the conclusion that the main factors are the following three: (i) talents and skills for the social entrepreneurship, (ii) time-discount factor, and (iii) initial conditions such as an *ex ante* human network for the race game and an *ex ante* investment in human capital for the waiting game.

From the above conclusion and the analytical results leading to it, some implications on educational programs for social entrepreneurship are derived.

In what follows, this chapter is organized as follows: In the next section, the main logic is summarized. In the third section, the basic assumptions and concepts are explained. In the fourth section a constituent supply process is modeled by a waiting game called "leader-follower game" played by one social entrepreneur and other n members of the society. An eco-goods scheme is put into this constituent supply game, and some analytical results are derived. The dynamic process of the game is omitted because the analytical framework and the main results are essentially the same as those of the previous chapter. In the fifth section, the eco-good scheme is examined in the situation where it should be formulated in the analytical framework of the race game. It is confirmed that the analytical results are the same as the case of the power-struggle game and those results are compared with those of the waiting game. The last section concludes this chapter.

2. The Main Logic and the Base Model

The base model set up with a view to explaining the main logic is based on the following and assumptions: A society comprised of $(n+1)$ members, denoted by $N=(0,1,\ldots,n)$, has to make decision of whether or not a public good is provided, on a voluntary basis, by means of a selective-incentive scheme. Once the process of providing the public good is started, it continues to the final stage whose finite time-horizon is denoted by T. A selective-incentives scheme called the "eco-goods" must be carried out to finance the cost of the public good. It is undertaken by a social entrepreneur who comes out from the society members. All members are assumed to be homogeneous except for their relative competences and talents for the social entrepreneurship and except for the benefit obtainable from the public good. The game begins from the first stage and ends at the final stage, T. The game is divided into two stages: the first is the organizing stage and the second is the provision stage. In the organizing stage, the social entrepreneur must create some new ideas on selective-incentives scheme—in this chapter, he has to design the eco-good scheme —, make plans, and talk other consumer-members who purchase a market commodity selected as the eco-good into going along the eco-good scheme by means of which the cost to provide the public good is financed. In this stage, he also announces that a fixed amount is deducted from sales-proceeds in order to cover his salary and the other cost of providing the public good. For convenience, these deducted amounts are represented by the "salary" which is a reward or compensation for both the organizing work and the managing work done by the social entrepreneur.

Just at the end of the organizing stage or just at the beginning of the provision stage, the salary is set at a fixed level through a bargaining between the social entrepreneur and the organized members, but the bargaining process is omitted in this chapter. At the same time, he declares that he is subjected to the "non-distribution constraints."[23] This not-for-profit constraint

[23] In general, some collective good can be provided as a private good, too. As to how to

is chosen for the sake of solving the principal-agent problem arising in carrying out the managing work in the provision stage. As was said in the previous chapter, the principal-agent problem with the managing work is aroused by the consumer-members' mistrust of the social entrepreneur's promise to use the net sales-revenues only for provision of the public good. It is assumed that the sense of mistrust increases in proportion to the amount of the salary claimed by the social entrepreneur and that the eco-good purchased by the consumer-member is reduced in proportion to the sense of distrust. Such a mistrust problem induces the social entrepreneur to solve it, when he decides on the salary. The social entrepreneur appeals for the not-for-profit constraint by accepting the lower level of the salary than the individualistically-optimal level.

In the provision stage, each consumer-member makes decision on his purchase of the eco-good just after the salary has been fixed on the condition that the social entrepreneur is subjected to the constraint of the not-for-profit. On the other hand, the social entrepreneur is required to put his "final hands" to finalize the process of producing the public good in each constituent stage. Then, the final outputs are provided as a public good in each constituent stage of the provision stage. The social entrepreneur's final hands are represented by his managing work, and have an influence upon the quality and quantity of the public good. These constituent supply-processes continue until the end of the provision stage.

At the initial point of the eco-good scheme, each member of the society has to make decision on whether to play the role of the social entrepreneur. Their decisions are made on the condition that one social entrepreneur will do for undertaking the eco-good scheme and that it may be so sufficiently profitable as to induced more than candidates to come out for a monopoly, or not so profitable as to guarantee a reward exceeding the net-payoff gained if he is a

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classify private and public goods, see Ueda (2002). Furthermore, it is assumed that the social entrepreneur does not gain "profits in disguise" such as perks supposed by Glaeser (2002) and Glaeser and Shleifer (1998). It is because an objective of this chapter is to derive the rational foundations of the not-for-profit organization.

consumer-player. Then, the following question springs up: who is the first to become the social entrepreneur? This question is answered by analyzing the two types of game models mentioned above and by deriving the subgame-perfect equilibrium of those games. In the analyses, the main assumptions to be noted are in what follow, below.

Firstly, in the provision stage, at least one member has to meet a competence requirement for the managing work, relative to his salary and benefits obtainable from the public good. If not, he cannot compensate even his managing work. The higher is his salary, the bigger his net-benefit becomes. But when it is raised, the net-benefits of the organized consumer-players, which are gained by the public good, tend to decline. The salary is settled by way of bargaining on the condition that it must reconcile the participation constraints of the social entrepreneur with those of other organized members. As the salary becomes larger, then, the social entrepreneur appears more of a "for-profit" entrepreneur type or of a self-interested political entrepreneur type in the sense that pecuniary revenues have to account for a larger weight in his payoff. In the opposite case, by contrast, the social entrepreneur appears more of a volunteer-leader type in the sense that pecuniary revenues account for a negligible weight in his payoff.

Secondly, in the organizing stage, the participation constraints on the organizing work also have to be met. Then, preference for the public good and competences for the organizing work are crucial to classifying the game to the race game and the waiting game. The logic of classification is as follows: If it is enough for one social entrepreneur to carry out the organizing work, only he has to bear the cost of the work. If the payoff to a free-rider is larger than the payoff to the social entrepreneur, but none the less it is better for him to bear the cost of the organizing work than to end up without the public good, then they are in a *waiting game*. Other members may as well free-ride on his costly work. If, on the contrary, the payoff to the social entrepreneur is larger than those of the free-riders, and when more than two players have such a net payoff, then they are in a *race game*. Since the not-for-profit constraint is sure to be adopted by the social entrepreneur just before the provision stage, the

waiting game may seem to be more suitable to formulating the eco-good business model. However, the situation where the race game is suitable cannot be ignored, since the eco-good scheme may be undertaken in a closed network-community such as the community-network along a main river mentioned in the introductory part of this chapter, and therefore it has a monopoly position in such a community market.

The analytical results are the same as those in the previous chapter, mutatis mutandis: That is, a member characterized with high competences and talents for the organizing and managing work, higher discount factor, and more persuasive bargaining skills is likely to be the first to become the social entrepreneur.

3. The Concepts and Assumptions

In this section, the basic concepts and assumptions relevant to the eco-good scheme are explained.

3.1 Public Good, Reconsidered

The collective good or common interest examined in this chapter is of a public-good nature. The public good is classified into two cases: the first case is that it is provided by government organizations and the second is that it is provided in private markets. As Ueda (2002) put it, whether a collective good is provided as the government-providing public good or as the market-providing private good depends on a change in the transaction cost relative to the quality-quantity output brought about by a change in the supply regime. If they should be provided as a private good, the price must be able to cover the transaction cost including the enforcement cost such as those of collecting charges or fees, in return for, if any, an increase in the quality-quantity output of the collective good. If, on the contrary, they are provided as a government-providing public good, the existing tax-gathering organs can take on the tasks of collecting those charges and fees, the transaction cost can be left out of consideration at the cost of a decrease in the

quality-quantity output. Thus, if the positive effects of a decrease in the transaction cost more than make up for the negative effects of a decrease in the quality or quantity output, then they should be provided as a public good provided by government, and vice versa.

Collective goods concerned in this paper are supposed to be the common interests of a large group, which are usually realized through someone's coordinating the group members into a cooperative network. The positive external effects of mountain forests are an example. It is the case that the monitoring and enforcing cost required to provide those benefits may be so high as to be called "non-excludable." If based on such a reasoning, the collective good relevant to this chapter is of a public good nature but the cost to provide it can be financed by the means of a private scheme called the "eco-good business" model undertaken by a social entrepreneur, because part of the transaction cost is paid when the eco-good is purchased in the market.

3.2 Social Entrepreneurship: Two Main Tasks

There assumed to be a society with $(n+1)\,members$, defined by $N = (0,1,2,\dots,n)$. If the eco-good scheme is carried out, at least one of them has to become social entrepreneur. He takes the initiative in providing a collective good on by means of the eco-good scheme. The social entrepreneurship has to be shown in two arenas or two different stages. In the first arena called *organizing stage*, he has to arrange for the selective-incentives scheme prior to other members' decision on whether and how much to purchase the eco-good. All tasks required for this arrangement are called the *organizing work* en masse. It is costly, but is of an non-verifiable nature. Thus, it has to be undertaken subjected to the constraint of an incomplete contract. In order to overcome the hold-up problem, the social entrepreneur is assumed to undertake the eco-good scheme. In the second arena called *provision stage*, he has to carry out the eco-good scheme, i.e., to turn the net proceeds of the private good-cum-public good into financing for the public good, and to put his hands on them to finalize the production process. His works at this second stage, called the *managing work* en masse, are indispensable for determining

the final quality-quantity level of the public good. The supply of the public good is, therefore, a function not only of direct production-factors paid from those net-proceeds but also of the managing work. This work suffers from agent problem, but the social entrepreneur alleviates this problem by his appealing to the "not-for-profit" constraints.

3.3 The Eco-Good Business Model

When public goods are supplied on a voluntary basis, in general, they can be financed not only by the scheme of voluntary-contributions, examined in the previous chapter, but also by means of the "selective-incentives" scheme argued by Olson (1965). The selective-incentives scheme can be classified into two types: (1) an entrepreneurial business scheme such as a private goods-cum-collective good, and (2) a non-entrepreneurial scheme such "by-products" of a private good. Olson (1965) took up many examples for the latter. Examples for the former are the voluntary scheme of charity lotteries of Morgan (2000), the eco-good scheme of Ueda and Svendsen (2002), and that of Nishizaki, Ueda, and Sasaki (2004, 2005). Furthermore, Pecorino (2001) and Ueda (2004) proved the efficacy of a business scheme of private good-cum-public good. Needless to say, the eco-good scheme taken up in this chapter belongs to the former category of the selective-incentive scheme and is a generalization of those previous studies.

The eco-good scheme is based on the following three conditions or assumptions: The *first* one is that the social entrepreneur announces the scheme including his salary, θ, just at the end of the organization stage or just at the beginning of the provision stage. The cost of the organizing work which is done by j member in a generic term, is denoted by C_j. The *second* one is that each organized consumer-player has to decide on how much to purchase the eco-good with a given price, p. The private good which is chosen to serve as the eco-good is a necessity good with sufficient demands at the prevailing market-price, denoted by p. The quantity purchased by i member is denoted by y_i. This second assumption means that the i consumer-player makes decision of y_i on the condition that she makes some sympathetic

expectations on the consuming behaviors of other organized consumer-players. To be concrete, it is assumed that she expects m players, $0 \leq m \leq n$, including her to behave in the same way. The net proceeds of the eco-good scheme, denoted by B, are defined by Eq. (1).

(1) $B = p\sum_{i\neq j}^{m} y_i - C\left(\sum_{i\neq j}^{m} y_i\right) - \theta,\ C' > 0, and\ C^{"}>0.$

In the above, $C(\sum_{i\neq j}^{m} y_i)$ is the cost to produce the amount of the eco-good, $\sum_{i\neq j}^{m} y_i$. In what follows, it is omitted for simplicity and the cost to produce the eco-good is represented by the fixed salary, θ. The *third* one is that in finalizing the process of supplying the eco-good, the social entrepreneur puts his final hands on the total net proceeds *less* salary, and then the quantity-quality level of the public good is determined. The final hands of the social entrepreneur represent the managing work in this model, and they are *en masse* denoted by e. The social entrepreneur's competence for the managing work is expressed by the final hands' function, $\varphi_j(e)$, if the j member is the social entrepreneur. It is assumed that $\varphi_j'(0) > 1, \varphi_j' > 0, and\ \varphi_j^{"} < 0$, for $e > 0$. The second assumption and the third one in the above constitute one constituent game in the provision stage. They are repeated finitely until the end of the time-horizon, T, which is assumed to be the same for all players. In each constituent stage, the organized consumer-players and the social entrepreneur play a constituent provision game.

3.4 The Supply Function of the Public Good

The supply function of the public good is defined by (2), if j player takes on the social entrepreneurship.

(2) $f_j(Y, e: \theta) = pY - \theta + \varphi_j(e),\ Y = \sum_{i\neq j}^{n} y_i.$

3.5 The Preference Functions and Income Constraints of the Provision Stage Game

In this subsection, the preference functions and income constraints of each constituent-stage game in the provision stage are defined.

First of all, the preference function of i player, denoted by U_i, and that player's income constraint, if she is an organized consumer-player and j player is the social entrepreneur, are defined by (3) and (4), respectively.

(3) $U_i\left(x_i,\ y_i, f_j(Y, e{:}\,\theta)\right) = x_i + v_i(y_i) + u_i\left(f_j(Y, e{:}\,\theta)\right),\ v_i' > 0,\ v_i'' < 0;\ u_i' > 0, u_i'' < 0.$

(4) $I_i = x_i + py_i,\ \forall i \neq j.$

In the above (3), $v_i(y_i)$ represents the selective-incentives defined by Olson (1965), i.e., private benefits gained by purchasing the eco-good. The payoff function U_i is a quasi-concave function of y_i. In (4), x_i is the private good, which is assumed as the numeraire.

Due to the agent problem, consumer-players refrain from purchasing the eco-good in accordance with their optimal amount which is set without the agent problem, and the consumer-player's mistrust which arouses the agent problem is formulated by multiplying a discount factor called the "mistrust function." However, for mathematical convenience, the mistrust function is omitted here and is explicitly taken into consideration in the fifth section of this chapter.

Next, the payoff function and income constraint of the social entrepreneur in each constituent stage in the provision stage are defined by (5) and (6), respectively, if j player is the social entrepreneur, on the condition that he does not purchase the eco-good.

(5) $U_j\left(x_j,\ f_j(Y, e;\ \theta)\right) = x_j + u_j\left(f_j(Y, e;\ \theta)\right);\ \ u_j(0) = 0,\ u_j' > 0,\ u_j'' < 0$ for $f_j > 0.$

(6) $I_j + \theta = x_j + e.$

It should be noted that though the workload of the managing work is counted into the preference function of the social entrepreneur, denoted by U_j, the one of the organizing work is not counted in here. This is because the latter is inflicted on the social entrepreneur in the organizing stage prior to the provision stage. When, therefore, we define the payoff functions for the game including the organizing stage, the workload of the organizing work is counted in.

4. The Backward Induction 1: The Analysis of the Provision Stage

In this section, each constituent-supply process in the provision stage, defined by the constituent-stage game, is formulated in the analytical framework of a one-stage game played by n consumer-players and one social entrepreneur. The strategy-set of each consumer-player is the amount of the eco-good purchased by her and the one of the social entrepreneur is the workload of his managing work. The provision stage is comprised of a series of the constituent-stage game, starting from some t stage and ends at the final T stage. The discount factor is normalized to the first stage of the whole game comprised of the organizing stage and the provision stage.

4.1 The Constituent-Stage Game

The constituent-stage game has the Nash equilibrium, but the characteristics of the equilibrium depend on how each consumer-player expects other organized consumer-players behave. In other word, those characteristics depend on the "conjecture type." In what follows, the conjecture type is classified into the following two extreme archetypical classes: the first one is called the zero-conjecture and the second is called the sympathetic conjecture. Whilst the first one assumes that each player does not expect others to correspond to his or her behavior, the second assumes that each consumer-player expects other consumer-player except the social entrepreneur to behave and feel in the same way as she does, as well as

except that there are differences in talents and competence for the social entrepreneurship. The Nash equilibrium is examined for each conjecture, on the simplicity assumption that the second derivatives of $v_i, u_i,\ and\ u_j$ are all a negative constant, and that p is normalized to unity, $i.e., p = 1$.

The Nash Equilibrium with the Zero-Conjecture

The optimization problem of the i consumer-player and that of the $j$social entrepreneur are formulated by (7) and (8), respectively.

(7) $Max\ _{y_i} U_i = I_i - y_i + v_i(y_i) + u_i\left(y_i + \sum_{h\neq i,j}^{n} y_h + \varphi_j(e) - \theta\right).$
(8) $Max\ _{e}\ U_j = I_j + \theta - e + u_j\left(\sum_{i\neq j}^{n} y_i + \varphi_j(e) - \theta\right)$

Assuming the inner solutions of both (7) an (8), the first necessary conditions are derived, and after arrangement, they are re-written by (9 and (10), respectively.

(9) $v_i'(y_i) + u_i' = 1,\ \forall i \neq j.$
(10) $u_j' \cdot \varphi_j' = 1.$

The existence of the Nash equilibrium with the zero conjecture is proved by the following Lemma1.

Lemma 1

There exists the Nash equilibrium of the constituent-stage game which consists of the provision stage in the eco-good scheme.

Proof: It is obvious that y_i and e belong to a compact and convex set, and that U_i and U_j are continuous and quasi-convex with respect to y_i and e, respectively. Thus, the existence of the equilibrium is assured, according to the popular theorem on the Nash equilibrium. Q.E.D.

The Nash Equilibrium with the Sympathetic Conjecture

If the sympathetic conjecture replaces the zero conjecture and m organized consumer-players are redefined to be symmetric (hereafter, the suffix is

omitted), the following equalities hold: $\sum_{h=1}^{m} y_{i_h} = my,\ y_{i_1} = y_{i_2} = \cdots = y_{i_m} \equiv y$, where m is generic number, $s.t., m \leq n$.

It is obvious that there exists the Nash equilibrium with the sympathetic conjecture on the above assumptions.

However, even on these simplified assumptions, the uniqueness of the Nash equilibrium is not assured, as shown in what follows: First of all, (7) and (8) are revised to (7)'and(8),' respectively.

(7)' $Max_{\ y}\ U = I - y + v(y) + u\big(my + \varphi_j(e) - \theta\ \big).$
(8)' $Max_{\ e}\ U_j = I_j + \theta - e + u_j\big(my + \varphi_j(e) - \theta\ \big).$

Assuming the inner solutions of both (7)' and (8),' Eq.(9)' and (10)' are obtained as the best-response function, respectively.

(9)' $v' + mu' = 1.$
(10)' $u_j'\varphi_j' = 1.$

The uniqueness of the Nash equilibrium is proved, if those best-response functions cross in the first quadrant, subject to the constraint of (9)' and (10)'. In order to show it, take the differential of (9)' and of (10)' and arrange the results, and then Eq. (11) and (12) are derived, in turn, subject to (9) and (10).

(11) $\partial y/\partial e = -u^{"}\varphi_j'/(v^{"} + mu^{"}) < 0,$ and
(12) $\partial y/\partial e = -[u_j^{"}\varphi_j' + u_j'\varphi_j^{"}/m\varphi_j' u_j^{"} < 0,\ s.t., (9)'\ and\ (10)'.$

The negative signs of both (11) and (12) may make it possible that the best-response functions cross in the first quadrant of (e, y) plane under some conditions, but those conditions are not assured.

The Static Analysis

Finally, let's examine the effects of a parametric change in the salary on both y and e in the neighborhood of the equilibrium. In what follows, the static analysis is applied to the case of the sympathetic conjecture, for

simplicity. For this purpose, derive the total differential of (9)' and that of (10)' and furthermore, rearrange them to derive $\partial y/\partial\theta$ and $\partial e/\partial\theta$. Then, the inequality relation (13) and (14) are obtained.

(13) $\partial y/\partial\theta = \{u^{"}\varphi_j^{"}u_j'\}/\{(v^{"} + mu^{"})u_j'\varphi_j^{"}\} > 0$, and
(14) $\partial e/\partial\theta = \{v^{"}\varphi_j'u_j^{"}\}/\{(v^{"} + mu^{"})u_j'\varphi_j^{"}\} > 0,\ s.t.,(9)'\ and\ (10)'.$

The positive signs of both (13) and (14) mean that a parametric increase in the salary brings about not only an increase in the amount of the eco-good purchased by the consumer-players but also an increase in the managing work done by the social entrepreneur at each constituent-stage.

The former parametric effect is brought about by the effects of an increase in the salary on consumer-player's correspondence to a decrease in the financial sources of the public good brought about by the salary-increase. That is, the consumer-players are induced to increase the amount of the eco-good purchased by them for the sake of compensating a "decrease in the financial sources to produce the public good" brought about by the increase in the salary.

On the other hand, the latter parametric effect is brought about by inducing the social entrepreneur to increase the workload of his managing work for the sake of making up for a decrease in the financial sources brought about by an increase in the salary.

In any case, an increase in the salary of the social entrepreneur, which was assumed represents the total cost to produce the eco-good, tends to raise not only the amount of the eco-good purchased by the organized consumers but also the workload of the managing work carried out by the social entrepreneur.

Furthermore, it is also shown that the total effects of a parametric change in θ on $e^*$and y^* are positive, as well as the partial effects shown in (13) and (14). For this purpose, the equations of the total effects, Eq. (15), and their solutions, Eq. (16) and (16)', are derived below.

$$(15)\quad \begin{bmatrix} v'' + nu'', & u''\varphi_j' \\ nu_j''\varphi_j', & u_j'' \cdot (\varphi_j')^2 + \varphi_j'' u_j' \end{bmatrix} \begin{bmatrix} dy^*/d\theta \\ de^*/d\theta \end{bmatrix} = \begin{bmatrix} u'' \\ u_j'' \end{bmatrix}$$

$$(16)\quad dy^*/d\theta = u''\varphi_j'' u_j'/(v'' + nu'')u_j'\varphi_j'' > 0.$$

$$(16)'\quad de^*/d\theta = v''\varphi_j' u_j''/(v'' + nu'')u_j'\varphi_j'' > 0.$$

The total net-payoffs of each player participating in the provision stage are defined by summing up the payoff of each constituent-stage game starting from $\exists\, t$ stage ending at the final T stage. The total payoff of the consumer-player, denoted by π_i, and that of the social entrepreneur, denoted by π_j, are defined by Eq.(17) and (18), respectively.

$$(17)\quad \pi_i = \pi_i\left(\textstyle\sum_{i\neq j}^{n} y_i^*(\theta), e^*(\theta) : \theta\right) = \sum_{h=t}^{T} \lambda_i^{h-1} U_i(y_i^*, e^*, \textstyle\sum_{h\neq i,j}^{n} y_h : \theta)$$
$$= \textstyle\sum_{h=t}^{T} \lambda_i^{h-1} \left[I_i - y_i^* + v_i(y_i^*) + u_i\left(\sum_{i\neq j}^{n} y_i^* - \theta + \varphi_j(e^*)\right)\right].$$

$$(18)\quad \pi_j = \pi_j\left(\textstyle\sum_{i\neq j}^{n} y_i^*(\theta), e^*(\theta) : \theta\right) = \sum_{h=t}^{T} \lambda_j^{h-1} U_j(\textstyle\sum_{i\neq j}^{n} y_i^*, e^* : \theta)$$
$$= \textstyle\sum_{h=t}^{T} \lambda_j^{h-1} \left[I_j - e^* + \theta + u_j\left(\sum_{i\neq j}^{n} y_i^* - \theta + \varphi_j(e^*)\right)\right].$$

In the case of the sympathetic conjecture, the above definitions are revised by omitting the suffix i and by replacing y_i, u_i, π_i, and λ_i with y, u, π and λ, in turn.

5. The Backward Induction 2: The Alternative Logic of Rational Not-for-Profit Firm

Just before the provision stage begins at $\exists\, t$ stage, the social entrepreneur has to make decision of the salary level, denoted by θ, which he announces it to the organized consumer-players prior to their decision on how much to purchase the eco-good. As shown by the static analysis in the previous subsection for the case of the sympathetic conjecture, an increase in the salary brings about an increase in both of y^* and e^*. As is shown in the inequality

(19) below, however, an increase in the salary invites a decrease in the payoff which any consumer-player gains in the provision stage.

(19) $\partial\pi/\partial\theta = \sum_{h=t}^{T} \lambda^{h-1}\{-u'(\theta)\} < 0.$

The above inequality is derived by the analysis of (17) after omitting the suffix i.

Regarding the effect of a parametric increase in the salary on π_j, it is known by deriving the social entrepreneur's optimal level of θ, denoted by θ_S and defined as the level of θ at which π_j is maximized. Assuming the inner solution, the first necessary condition for the maximization is defined by (20) and the result is written by (20)'.

(20) $\partial\pi_j/\partial\theta = \sum_{h=t}^{T} \lambda_j^{h-1}\{1 - u_j'(\theta)\} = 0.$
(20)' $u_j'(\theta) = 1.$

Eq.(20)' means that the social entrepreneur sets the optimal level of his salary at the level at which an increase in his revenue brought about by a marginal increase in the salary is just equal to the absolute value of the marginal decrease in the utility obtainable from the public good. This decrease in the utility is caused by the effect of an increase in the salary on a decrease in the net-financial sources collected from the net-proceeds of the eco-good with a view to providing the public good.

Here, as a preliminary, it is shown that *on the condition that the social entrepreneur is subjected to the not-for-profit constraint,* the optimal level of the salary is different among the consumer-player, the social entrepreneur and the for-profit entrepreneur. Denote the optimal level of the salary for the consumer-player by θ_C. Then, it is obvious from (19) that $\theta_C = 0$. On the other hand, as to θ_S, from (20)' and the assumption of the inner solution, it turns out that the following inequality relations hold: $0 < \theta_S < \sum_{i\neq j}^{n} y^*$. The analytical result that the consumer-player's optimal level, θ_C, is set at the zero level means that the smaller the salary is, the bigger the consumer-player's payoff. That is, the smaller the salary is, the better for the

consumer-player. For the sake of the consumers' interests, a low salary is better as low as possible, but in order to set the salary at the zero level the social entrepreneur is required to be a volunteer type of entrepreneur who can undertake the eco-good business without any reward or compensation for his workload. This contradicts with the basic assumption of this chapter, according to which the eco-good scheme is undertaken by the social entrepreneur but not by a volunteer type of social organizers. If compared with the salary claimed by a for-profit entrepreneur, denoted by θ_P, the social entrepreneur's optimal level of the salary, θ_S, is less than the one claimed by the "for-profit" entrepreneur, θ_P, since the benefit of the public good is counted into the payoff function of the social entrepreneur but not into the one of the for-profit entrepreneur. It is the best for the for-profit entrepreneur to raise the salary level as high as possible, subjected to the constraint that it cannot surpass the net-proceeds of the eco-good. This inference on the optimal level for the for-profit entrepreneur leads to the following relation: $\theta_P \approx \sum_{i\neq j}^{n} y^* > \theta_S$. That is, since the for-profit entrepreneur does not gain any benefit from providing the public good, it is his best to set the salary at as a high level as possible and therefore, to appropriate all of the net-proceeds of the eco-good.

Next, keep it in mind that θ_S was determined by the social entrepreneur for his sake on the condition that he is subjected to the not-for-profit constraint, and suppose that if the social entrepreneur announces that, without announcing that he is subjected to the not-for-profit constraint, the salary level is set at a higher level than θ_S. Then, those consumer-players have a sense of mistrust of the social entrepreneur's managing work which should be done later than the time of the announcement. From such mistrust the so-called principal-agent problem arises. Assume that the mistrust is approximated by Eq. (21). It is called the "mistrust function", denoted by μ.

(21) $\mu = \mu(\theta),\ \mu(\theta_S) = 1,\ \mu' < 0,\ for\ \theta > \theta_S,\quad 0 < \theta < \sum_{i\neq j}^{n} y^*.$

If the social entrepreneur takes the consumers' mistrust into allowance at the time of his announcing the salary level, the mistrust function is counted in

and it serves as a coefficient of $y^*(\theta)$. The coefficient is supposed to reflect his allowance of the consumers' mistrust. That is, the mistrust problem is technically coped with the assumption that $y^*(\theta)$ is replaced with $y^*(\mu) \equiv \mu(\theta)y^*(\theta)$. Then, the social entrepreneur's decision on the optimal salary solving the mistrust problem, denoted by θ_μ, is determined by maximizing the payoff function of the social entrepreneur revised by replacing $y^*(\theta)$ with $y^*(\mu)$ defined in the above. The optimal level of the social entrepreneur's payoff with the revised function is defined by Eq. (22), below.

(22)

$$\pi_j(\theta_\mu) = max_\theta\, \pi_j(\theta) \equiv \sum_{h=t}^{T} \lambda_j^{h-1} [I_j - e^*(\theta_\mu) + \theta_\mu + u_j(\sum_{i\neq j}^{n} \mu(\theta_\mu)\, y^*(\theta_\mu) - \theta_\mu + \varphi_j(e^*(\theta_\mu))].$$

In order to examine the total effects of a parametric increase in θ, let's redefine the payoff functions of the social entrepreneur and the consumer-players without the not-for-profit constraint by replacing $y^*(\mu)$ with $\mu(\theta)y^*(\theta)$. They are given by Eq.(23) and (24), respectively.

(23) $\pi_j(\mu) = \sum_{h=t}^{T} \lambda_j^{h-1}\ [I_j - e(\theta) + \theta + u_j\left(\sum_{i\neq j}^{n} \mu(\theta)\, y(\theta) - \theta + \varphi_j(e)\right)]$

(24) $\pi_i(\mu) = \sum_{h=t}^{T} \lambda_j^{h-1}\ [I_i - \mu(\theta)y(\theta) + v_i(\mu(\theta)y(\theta)) + u_j\left(\sum_{i\neq j}^{n} \mu(\theta)\, y(\theta) - \theta + \varphi_j(e)\right)]$

The best response functions for a given θ are derived from the first necessary conditions on the condition that there exist the inner solutions. After rearrangement of the maximizing conditions, the best response function of the social entrepreneur and the one of any consumer-player are given by (25) and (26), respectively.

(25) $u_j' \cdot \varphi_j' = 1.$

(26) $v' + nu' = 1,\ v_i = v,\ u_i = u,\ for\ i \neq j.$

From (25) and (26), it is derived that the signs of the slope of the best response functions are negative, as shown by (27) and (28), respectively.

(27) $\partial y/\partial e = -\left(\varphi_j^{''}u_j' + u_j^{''}\varphi_j'\right)/u_j^{''}\varphi_j' n\mu < 0.$
(28) $\partial y/\partial e = -\left(u_i^{''}\varphi_j'\right)/(v_i^{''} + u_i^{''}\mu n^2) < 0.$

Finally, the total effects of a parametric increase in the salary beyond θ_S are derived from solving Eq. (29).

$$(29)\quad \begin{bmatrix} \varphi_j^{''}u_j' + u_j^{''}\varphi_j', & n\mu\varphi_j' \\ nu_i^{''}\varphi_j', & n(\mu v_i^{''} + n\mu u_i^{''}) \end{bmatrix} \begin{bmatrix} de/d\theta \\ dy/d\theta \end{bmatrix} = \begin{bmatrix} u_j^{''}\varphi_j'(ny\mu' - 1) \\ -v_i^{''}y\mu' - nu_i^{''}\cdot(n\mu' y - 1) \end{bmatrix}$$

The solutions are given below.
(30) $de(\mu)/d\theta = A_1/A,$ and
(30)' $dy(\mu)/d\theta = A_2/A > 0.$

In the above solutions, A is the determinant of the coefficient matrix and $A_{h,}\ h = 1, 2,$ is the determinant of the matrix with the h column being replaced by the fixed vector.

It is obvious from the assumption that $dy(\mu)/d\theta = \mu' y + \mu\, dy^*/d\theta < dy^*/d\theta$. Furthermore, form the definition of θ_S, it is trivial to prove that $\pi_j(\mu(\theta)) < \pi_j(\theta_S)$ for $\theta > \theta_S$.

On the other hand, the total effect of an increase in θ on the managing work depends on some conditions as shown in what follows. First of all, note that A is positive but the sign of A_1 is not definite, since $A_1 = (ny\mu' - 1)\{nu_j^{''}\varphi_j' \cdot (\mu v_i^{''} + n\mu u_i^{''}) + n^2\mu\varphi_j' u_i^{''}\} + n\mu\varphi_j' v_i^{''}\mu'$. Because $(ny\mu' - 1)$ is negative and $n\mu\varphi_j' v_i^{''}\mu'$ is positive, the sign of A_1 is positive, if the sign of the middle parenthesis of the first term on the right side is negative. More strictly speaking, $A_1 > 0$, if $nu_j^{''}\varphi_j' \cdot (\mu v_i^{''} + n\mu u_i^{''}) < -n^2\mu\varphi_j' u_i^{''}$. Note both sides of the inequality are positive. On the contrary, $A_1 < 0$, if the following two

conditions are met at the same time: the first one is that $nu_j^{"}\varphi_j' \cdot (\mu v_i^{"} + n\mu u_i^{"}) > -n^2\mu\varphi_j' u_i^{"}$, and the second is that the absolute value of $(ny\mu' - 1)$ is sufficiently large. The socio-economic meaning of the first condition is not obvious but the second one can be definitely met, if $|\mu'|$ is sufficiently large. This last condition means that if the social entrepreneur raises the salary beyond θ_S, the mistrust problem or the agent problem becomes very serious and therefore the social entrepreneur has to take it into allowance that the consumer-player responds to the increase in the salary by drastically reducing the amount of the eco-good purchased by them. If those sufficient conditions for A_1 to be negative are met, it holds that $de^*/d\theta < 0$. That is, the total effect of an increase in the salary beyond θ_S on the managing work is negative (the social entrepreneur reduces his workload of the managing work)

In any case, if he raises the salary beyond the optimal level gained on the condition that he is subjected to the not-for-profit constraint, the payoff of the social entrepreneur becomes smaller than the payoff he can gain if he is subjected to the not-for-profit constraint. In particular, if the salary is increased in such a way on the condition that the mistrust problem is serious, the managing work can be reduced. The amount of the eco-good purchased by the consumer-players still increases but the rate of the increase is less than the one with the not-for-profit constraint. Then, the decrease in his payoff is accompanied with a decrease in the public good. To sum up, if the mistrust problem is taken into serious consideration by the social entrepreneur, it is rational for him to accept the not-for-profit constraint.

6. The Backward Induction 3: The Organizing Stage

The organizing stage is classified into the following two types: the first is formulated by the analytical framework of waiting game and the second is by the one of race game. The "eco-good business" model is a market-oriented scheme but according to the previous argument in the fifth section of this chapter, it should be undertaken by the social entrepreneur on the condition that he is subjected to the constraint of not-for-profit organization. The rationality of the not-for-profit constraint may reflect the hard reality that it is

very costly or risky to undertake the business enterprise selling the eco-goods, if compared with uncertain benefits expected to be gained by taking on the roles of the social entrepreneur. In this case, a waiting game is suitable for formulating the eco-good scheme. In particular, the analytical framework of the waiting game may is more suitably applicable to examining the organizing stage. On the other hand, the eco-good scheme may have better be undertaken in a monopoly, if we take the following two circumstances into allowance: the first one is that since the scheme aims to finance the cost of achieving the common interest of a large group of inhabitants living in the river sides of a main river, it may be a profitable business enterprise, and the second is that although it is a profitable enterprise, one organization will do for undertaking such an enterprise due to the same social backgrounds as the first one. In this case, by contrast, the analytical framework of race game may better fit to examining the organizing stage of the eco-good scheme.

In any case, the waiting game and the race game defined in the fifth and fourth chapter in the first part of this book are applicable, *mutatis mutandis*, to the formulation and examination of the organizing stage of the eco-good scheme. Therefore, it is inferred that we can derive the main analytical results in line with the mathematical procedure taken in those chapters. In the following two sections, the main conclusions derived from analysis of each game are summed up, in turn.

6.1 The Main Conclusions Derived from the Analysis of the Organizing Stage in the Waiting Game Model

Suppose that at least one member-player has to take on the organizing work and managing work indispensable for carrying out the eco-good scheme, and that he has to come on the organizing stage from a society comprised of $(n + 1)$ members, but not from other pools of human capitals. All of those member-players acknowledge that there exists a common interest to all of the society members, such as the ecological system of mountain forests. But it is of a public good nature in the sense that all of them prefer free-riding on someone's initiative in achieving the common interest to their own the

initiative. This free-rider problem arises due to the following reasons: First of all, the organizing work is comprised of a series of creative work-efforts, begun from creating a new idea to solve the problem, through the process of talking other member-players into going along his plan, and ended with forming a cooperative network of those members. Secondly, since it suffers from the incomplete-contract problem, the organizing work is not guaranteed of a sufficient reward for it in spite of its being so costly. More strictly speaking, the benefit obtainable from achieving the common interest cannot make up for the costly organizing work to be done by the social entrepreneur, even if any consumer-member is ready to pay the direct cost to achieve the common interest, if claimed at the provision stage. As a result, any member prefers free-riding on someone's organizing work irrespective of the incentive for the managing work, and the common interest remains to be attained. Even the eco-good scheme has not overcome the incomplete-contract problem, until a means to overcome the incomplete-contract problem is found out and is implemented.

A long-run view point on the common interest comes up with a new solution to the hold-up problem. If the common interest is viewed in a long-run perspective, someone may be conscious that if the common interest remains to be achieved, things get more serious, and they infer that the worst scenario is waiting for them. For those members, it is better to take the initiative at some point of time than to wait until the end at which the worst scenario wait for them. At that point of time, the free-riding option stops being the best one. Such a dynamic process is formulated by the analytical framework of a waiting game defined below.

Let's assume for simplicity that the social entrepreneur clears the process of organizing other society members, who are denoted by $(0, 1, \ldots, n) \equiv N$, into a cooperative network by the following procedures: *Firstly*, the organizing work is divided into the workload to create and make a plan to carry it out at the beginning and the workload to negotiate with other players with a view to talking them into going along his plan. *Secondly,* whilst the first workload is denoted by $A_j, j \in N$, the second workload is formulated on the assumption that the negotiation process takes $(\Delta + 1)$ stages to finalize the organizing

process and that the j player has to spend the w_j amount of the workload per stage during $(\Delta + 1)$ stages. Δ is assumed as a constant parameter as well as A_j and w_j, and therefore differences in the competence for the organizing work among the players may be approximated by difference in both A_j and w_j, $j \in N$.

When the organizing work is begun by j player in $\exists t$ stage, the total workload he has to bear in order to finalize the organizing process is defined by (31) on the assumption that the first part of the organizing work is undertaken at the beginning of the organizing stage and that his time discount is a fixed parameter λ_j.

$$(31)\ C_j(t) = \lambda_j^{t-1} A_j + \sum_{h=t}^{t+\Delta} \lambda_j^{h-1} w_j = \lambda_j^{t-1}(A_j + w_j \frac{1-\lambda_j^{\Delta+1}}{1-\lambda_j})$$

Denoting by $\Pi_j^E(t)$ the total net-payoff which the j player can gain by playing the role of the social entrepreneur at the t stage in the waiting game, it is defined by (32).

$$(32)\ \Pi_j^E(t) = \sum_{s=t+\Delta+1}^{T} \lambda_j^{s-1} U_j(\theta) - C_j(t).$$

On the other hand, denoting by $\Pi_i^C(t)$ the total net-payoff that if the i player is a contributor-player, she can gain on the condition that some other player begins the organizing work at the stage t before she takes on the organizing work, it is defined by (33).

$$(33)\ \Pi_i^C(t) = \sum_{s=t+\Delta+1}^{T} \lambda_i^{s-1} U_i(\theta) = U_i(\theta)\lambda_i^{t+\Delta} \frac{1-\lambda_i^{T-t-\Delta}}{1-\lambda_i}$$

Comparing the above assumptions with those in the fifth chapter of the first part, it is obvious that the three conditions of the waiting game are satisfied. Therefore, it is inferred that the same conclusions as those in the fifth chapter can be derived from the analysis of the waiting game of this chapter. They are summed up below.

The Main Conclusions

According to the proof procedure of the backward induction, on the condition that all players are motivated to free-ride on other players' organizing work, the player whose critical stage comes in the latest takes the initiative in undertaking the eco-good enterprise and stands up in the first at the beginning in the first stage of the waiting game. The critical stage, denoted by τ_j in a generic term, is determined by those parametric factors which are relevant not only to the talents and skills for the organizing work but also to the constituent utility increased by achieving the common interest. Generally speaking, the more talented and skilful for the organizing work some player is, the larger discount factor he has, and/or the larger constituent utility he has, then the later (or the larger) the critical stage (or the critical value) of this player is.

Concretely speaking, a difference in the critical value originates in the difference in the following parametric factors: the first is the talents and skills for the organizing work measured by a combination of w_j, k_j and $c_j(Z)$ for a given Z, the definitions of which were given in the fifth chapter, the second is the time-discount factor defined by λ_j, and the third is the factors which have an influence on the constituent utility, U_j^L —the talents for the managing work, represented by φ_j—and the salary level determined on the condition of the not-for-profit constraint, denoted by θ_S.

6.2 The Main Conclusions derived from the Analysis of the Organizing Stage in the Race Game

If the race game defined in the fifth chapter of the first part is applied to the organizing stage of the eco-good scheme, it is inferred that essentially the same conclusions as those derived from the analytical results of the race game in the fifth chapter are derived. In order to formulate the organizing stage of the eco-good scheme, let's set up the base model of the organizing stage of the eco-good scheme on the basis of the following assumptions, detailed below.

First of all, though it is costly to take on the organizing work and, in reality,

too costly to ignore it, not a few people may launce into the eco-good scheme and dare to clear the organizing stage. This is because they expect to gain sufficiently large returns from such a costly or risky enterprise. In what follows, it is assumed that two candidate-players compete for the social entrepreneurship.

Secondly, in the actual business races through which one of the candidates is selected, "which one of the candidates wins the race" is known far before the race gets to the final stage. This is because the main cost factors consisting of the organizing work are usually common information shared by participants in the race. Those factors are represented by the three types of effort-cost as follows: (i) the cost spent before launching into the eco-good enterprise, named the "advance cost" *en masse,* which is comprised of the cost to create or design a new idea and plan, (ii) the cost to form a human network comprised of a core group or team as an advance guard, and (iii) the cost of winning over as many consumer-members as possible to the majority of the eco-good market.

The above third cost, named the "cost of the bargaining work," is comprised of the cost to win as many supporting consumers living in a special area as possible over to one of the competing candidate-players. Though the process of winning the majority can take various forms of sales campaigns, in any case, "to win the majority" means that the winner has a monopoly in the eco-good market.

The advance ideas or plans and the raised funds to finance the cost to form a human network have generally positive effects on the performance of the bargaining work. Those effects are taken into allowance by the following two additional assumptions: the first is that the influences of the advance ideas or plans are represented by the cost spent in advance with the aim of creating those ideas and plans, and the second is that those of a human network are represented by the amount of the fund raised in advance with the aim of forming a core-group. Therefore, the cost of winning over the majority may well be assumed to be a decreasing function of both the advance cost and the amount of the raised fund.

In what follows, it is assumed that though both the advance cost and the fund-raising cost are given at the beginning of the first stage in the organizing

process, the cost of bargaining-work is determined by the work-effort of bargaining which each candidate-player makes in each stage. More concretely speaking, the total work-effort of bargaining is measured by summing up all of the bargaining work made in those stages at the last of which the majority members must be wan over to one of two competing candidate-players. It means that after the stage in which the majority is organized somehow, any addition to the bargaining work is not required. Therefore, a difference in the work-effort of bargaining, i.e., a difference in the bargaining cost, is determined not only by a difference in the competency for the bargaining work but also by a difference in the advance cost and the fund-raising cost.

Based on those assumptions made in the above paragraphs, the organizing work is formulated by (a) to (d), as detailed below.

(a) The majority number that must be wan over to a victor side is denoted by n and the number of the stages at the last of which the majority is wan by j candidate are denoted by Δ_j. This is assumed to be determined by both n and the following two influential factors denoted by F *en masse*: The first is the work-effort of bargaining which is made in the process of winning over the majority,. It is denoted by $\omega_j^h, h = 1,2, \dots, \exists\Delta_j$, where ω_j^h means the work-effort of bargaining made by j candidate-player in the h stage and is defined definitely in the assumption (b) below. The second is competency for the bargaining work, measured by a function through which the effort-cost ω_j^h is transformed into the number size wan over by j player, explicitly defined by the assumption (d). Then, Δ_j −the number size of those stages at the last of which the majority number is wan over−is defined by $\Delta_j = \Delta_j(n;F),\ j = 1,2$. It is replaced with a reduced form, $\Delta_j(n)$, if analytical results gained by taking the positive effects of F into consideration are more robust than those by dismissing those effects. Furthermore, in accordance with the "as usual" assumption on the cost and the benefit, it is assumed that $\Delta_j'(n) > 0$, and $\Delta_j''(n) > 0,\ j = 1,2,$ and that $\partial\Delta_j/\partial F < 0$, and $\partial^2\Delta_j/\partial F^2 > 0,\ j = 1,2$.

(b) Denote by ω_j^t the work-effort of bargaining which j candidate-player, $j = 1,2,$ makes in the stage t. Then, the larger ω_j^t the j player makes, the more members he can win over. However, the maximum work-effort of

bargaining he can make in each stage is subjected to the constraint that the "benefit minus cost" is nonnegative in each stage.

(c) The advance cost is fixed at the beginning of the first stage and is assumed to be a given parameter, denoted by $k_j,\ j = 1, 2.$ Furthermore, it is assumed that the fund raised to form a human network, denoted by Z, is raised also at the beginning of the first stage and is fixed. The cost of raising the funds is defined by $c_j(Z), c_j' > 0, c_j'' > 0,\ j = 1, 2.$

(d) The assumption that the advance cost and the fund have a positive effect on the performance of the bargaining work is formulated as follows: Denote by $W_j(\omega_j^t; k_j, Z)$ the number size which the j candidate-player can win over by making the bargaining work-effort, ω_j^t, in the stage t under the condition that the advance cost, k_j, is spent and the fund, Z, is prepared at the beginning of the first stage of the bargaining process. Then, the effects of the bargaining work-effort, of the advance cost and the fund are formulated by (A1).

(A1) $$W_j(0) = 0,\ \partial W_j/\partial \omega_j^t > 0,$$
$$\partial^2 W_j/\partial(\omega_j^t)^2 < 0;\ \partial W_j/\partial k_j > 0;\ \partial W_j/\partial Z > 0,\ \ j = 1,2.$$

Thirdly, it should be noted that the winning-over processes cannot be kept secret and the information on them is usually out on the way to the final stage. Therefore, the end-result of the business race is known to all candidate-players at some stage before the end of the bargaining process. Since the structure of game characterized with complete information is suitable to describing such a leakage of information, the race-game set up in this section is assumed as a complete information game.

Fourthly, each candidate-player has a time-preference and it is represented by a discount factor, denoted by $\lambda_j,\ j = 1, 2,$ which is assumed to be given. Denote by $C_j\big(t;\ \Delta_j(n)\big)$ the total work-efforts made in the organizing stage, i.e., the organizing cost, for short. Then, at the first stage of the organizing process the j player expects to bear it if he starts bargaining at the stage, t, and ends the bargaining work at the stage, $t + \Delta_j(n)$. Then, it is defined by Eq.(34), on the condition that it is discounted at the beginning of the first

stage.

(34) $C_j\left(t;\ \Delta_j(n)\right) = \{k_j + c_j(Z)\}\lambda_j^{t-1} + \sum_{h=t}^{t+\Delta_j(n)} \lambda_j^{h-1}\ \omega_j^h,\ j = 1, 2.$

Fifthly, the payoff functions of the two candidate-players have to be defined in accordance with the role of which each player takes in the organizing process. Let's denote by $U_j^L\ (U_j^F)$, $j = 1, 2$, the net-benefits which j candidate-player can obtain just after he wins over the majority, by his taking the social entrepreneur's position to clear the organizing process (after he belongs to a follower or subjugated side) until the final stage of the eco-good enterprise, denoted by T. Furthermore, denote by $\Pi_j^L\ (\Pi_j^F)$, $j = 1, 2$, the total net-payoffs which if, on the condition that j candidate-player begins the organizing process in the t stage, he has a monopolistic position (if he is in the position of a follower or a subjugator after withdrawing from the race in the stage $(t + \Delta_{-j}(n))$ in which it turns out certain that the rival player, denoted by $-j$, wins), the j player can gain by participating in the race. Then, the j player's payoff function, if the organizing process is begun in the t stage, is defined by Eq. (35) and (36).

(35) $\Pi_j^L = \Pi_j^L(t) = \sum_{h=t+\Delta_j(n)+1}^{T} U_j^L\ \lambda_j^{h-1} - C_j\left(t;\ \Delta_j(n)\right)$, and

(36) $\Pi_j^F = \Pi_j^F(t) = \sum_{h=t+\Delta_{-j}(n)+1}^{T} U_j^F\ \lambda_j^{h-1} - C_j\ (t;\ \Delta_{-j}(n)),\ j = 1, 2.$

On the above assumptions on the eco-good scheme, the organizing stage of the eco-good can be formulated by the same analytical framework as the race game of a power struggle set up in the fifth chapter of the first part, and it is inferred that the same conclusions are derived from the analytical results.

The Main Conclusions

The player who can meet the conditions (1) to (5) is more likely to win the race for a monopoly in the eco-good business. Those five conditions are as

follows below.

(1) The benefit U_j^L gained by having a monopoly in the eco-good business is larger.

(2) The skills for fund-raising are more efficient. In other word, the cost to finance for forming a network of the consumer-members, denoted by $c_j(Z)$ for a given size of the members, Z, is smaller.

(3) The skills for bargaining are more efficient, or the function of transforming the workload of persuasion, denoted by ω_j^t into the organized members, denoted by W_j, is larger.

(4) The number size which must be organized to have a monopoly is smaller. Since it is a decreasing function of the advance cost k_j and the raised fund Z, it is determined by the talents for creating new ideas and plans and by skills to raise funds to finance the cost of setting up and maintaining a "van guard" organization such as the core members of a new business project.

(5) The discount factor is larger on the condition that U_j is large enough to the cost factors and that the number size of the final stage, T, is large enough relatively to the number of the stages to be cleared by the end of the organizing process.

7. The Concluding Remarks and Some Implications

The eco-good scheme is one of the "private good-cum-public good" schemes. The latter are one of "market-oriented business schemes" to which the by-product theory is applied with a view to achieving the common interest of a large group. It is a new solution to the public good problem with which a large group is faced, in the sense that it is a state-of-art idea and that successful experiments are expected from now onward. The eco-good scheme taken up in this chapter was designed and formulated on the basis of some examples such as preservation of mountain forests by way of forming a socio-economic network of forests-beneficiaries inhabiting in the river-side areas. It is applicable to preserving other types of natural common-pool resources on a

voluntary basis. Furthermore, we can observe that it has been applied to rebuilding local communities and local industries destroyed by the 2011 devastating earthquake, as well as the traditional contributions-scheme. It should be noted that even though they may not conscious, a social entrepreneur type of organizers play the key-role in undertaking an eco-good scheme type of re-building enterprises.

In the fiscal crisis which many of the modern states have to overcome, the eco-good scheme is one of the promising means to finance the cost of achieving common interests on a voluntary basis. However, we must not ignore the prerequisite condition for that scheme to be successful. We cannot emphasize it too much that the prerequisite condition is the existing of competent and talented candidates for the social entrepreneur. However, it is not easy to find out those candidates ubiquitously, since those candidates are required to be skillful and talented for the organizing work and the managing work, as was emphasized in this chapter. In order to prepare for the candidates' pool of the social entrepreneur, special educational programs to bring up those candidates may be required.

The Main Conclusions

Toward the Evolutionary Theory of the State and the Evolutionary Political Economy

This book was based on the following fundamental truths and categorical frameworks: Firstly, the state is one form of the society. Secondly, the society is the substance which exists to fulfill the common purposes of its members, which it is hard for an organ individual to achieve. Thirdly, Homo sapiens have several means to acquire necessities for survival. Fourthly, though they have also the homeostasis mechanisms which are combined in a "Russian doll" way with hierarchies, the human behaviors motivated by the selfishness of an individual organ or those behaviors programmed to promote the survival conditions of an individual organ are quite often in contradiction with those driven by the selfishness of the genes or those programmed to promote the long-run survival of the genes. Fifthly, the individualist organs who became conscious of the contradiction mentioned above have been applying the cognitive mechanisms to filling the gap between the individualist organ and the long-run self-interest seeking genes.

Based on those fundamentals, I derived the synthetic propositions on the state and on the collective action problem intervening public arenas and market arenas. They were classified into those on the state and those on the collective action problem, and are summed up below, in turn.

The Synthetic Propositions on the State

The first one is on the essential concept of the state. The synthetic proposition on it is that the state should be recognized as one societal form or an artificial organ with an obligation to fulfill those common purposes. As a corollary of this proposition, the "legitimacy of the

power" is definitely conceptualized as follows: only if the ultimate purposes of the society are fulfilled by exercising the state's power irrespective of the motives of a person in power, the exercise of the power is recognized to be legitimate.

The second one is on the criteria for judging a difference between the state and other societal forms such as the tribe-communities and chiefdom preceding the state—strictly speaking, the early stat. The synthetic proposition on it is the following: Firstly, the state is distinguished from the preceding kin-based communities by a change in military system from stone weapon system into metal weapon system. In particular, the early state is distinguished from kin-based communities by a bronze weapon system. Secondly, the state is discerned from the chiefdom by a change in the means of acquisition, from a war for plunder into a conquest for regular rule. An innovative change in the military system from a stone weapon system into a bronze weapon system brought about a change in the means of acquisition from peaceful trade to violent looting and, as a result, the bronze revolution brought about a change in the societal form from tribe community into the chiefdom. Furthermore, the application of the bronze revolution to production processes in conquered territories brought about a change in the exploitation from capricious looting to regular rule, and as a result, the early state emerged from the preceding chiefdom.

The third one is on the criteria for judging differences among various types of the state. The synthetic proposition on it is as follows: The type of the state is determined by the combination of a political-military van guard group with the main economic groups with the economic power to financially support and maintain the van guard group. The main economic groups are those engaged in the leading economic sectors of the age.

The fourth one is on the causality. The synthetic proposition on the causality is that the emergence of any societal form should be explicated under the causality category of Kant and Aristotle, which is comprised of the existing conditions, the external shock factors, the motives of the leading or ruling groups, and the results.

The fifth is on the political-military entrepreneurship. The political-military entrepreneurs are indispensable for the process of building any type of the state. They are classified into a power-seeker type and a state-man type. The difference is caused by a difference in the ways to solve the hold-up problem with which any candidate for the political-military entrepreneur is faced in the process of organizing the main group-members. Whilst the power-seeker type who is observed in the process of building an original state is motivated to undertake political-military enterprises by big gains obtainable from grubbing the power, the state-man type who is observed in the process of building a peripheral state is driven to set out into a state-building enterprise by some emotional mechanisms.

However, the applications of the evolutionary theory to all types of the state remain to be completed, even if the applicability could be proved in this book. In particular, it is urgent to examine the modern autocracy and the modern empire state from the view point of this book. The nation state under the mass-democracy is also one of the most urgent topics, if taking the serious fiscal crisis into account. However, it is sure that those urgent topics cannot be tackled without understanding the essence of the state, in particular, without grasping why and how the power serving as the last resort to the rule is generated and legitimated.

The Synthetic Propositions on the Collective Action Problem

In the second part of this book, it is shown how the collective action problems which arise particularly in the arenas intervening between politics and markets can be solved by the means of various voluntary schemes. The traditional models based on the by-product theory of public goods are refined not only by regarding the social entrepreneur as a key player in any voluntary scheme to solve the collective action problem, but also by emphasizing that it is rational for the social entrepreneur to be subjugated to the "not-for-profit" constraints. Although the social entrepreneur has to play key roles in any collective action, it have been overlooked by the proponents of the traditional voluntary schemes such as the private provision of public good, the voluntary contributions, and the private good-cum-public good. In this book, I focused on the following three topics which are considered to be relevant to the governance of a state: the first one is on the incentive problem of an entrepreneurial type of social organizers including political entrepreneur as well as social entrepreneur, the second is on the indispensability of both social entrepreneur and not-for-profit organization for undertaking any voluntary-contributions scheme, and the third is on the private good-cum-public good which is one of the applications of the Olson's by-product theory. The main propositions derived from refining the traditional models are summed up below.

The first synthetic proposition is on the personal requisites for the social entrepreneur. The main conclusion is that not only skills and talents for the organizing work and the managing work but also the high evaluation on long-run interests are requisites for the social entrepreneur.

The second are on the rational not-for-profit constraint. The main conclusion is that social entrepreneur accepts the not-for-profit constraint in order to overcome the agent problem which arises in the

process of providing collective goods or achieving the common interests of a large group. In the sense that the not-for-profit constraint is adopted for the sake of contributing to the self-interests of a social entrepreneur, it is rational to accept it.

The third proposition is on the incentive problem on the way to non-market activities. The incomplete-contract problem has to be solved in order to induce a political entrepreneur type of social organizers to take the initiative in achieving the common interests of a large group, since it arises in the process of organizing the members of a large group before realizing the common interests. This hold-up problem is solved by applying the property rights approach. It is inferred from the analytical results that the ownership to non-human capitals required for political activities for collective action should be given to political entrepreneurs.

In the fiscal crisis with which many of the modern states are faced, the voluntary schemes to achieve the common interests of a large group should be given more attentions and various schemes should be designed and undertaken with a view to replacing bureaucratic sectors. The social entrepreneur plays the key roles in achieving various common interests of a public good nature. However, since it is not easy for any person to take on the social entrepreneurship due to its requisite conditions, some special educational programs should be carried out in order to bring up candidates for the social entrepreneur.

An Implication to the Nation State in the 21st Century

The economic networks or international division of work since the late 20th century have been spreading on a worldwide scale and are still under way. Such an economic development reflects new technological innovations and is the way to adapt to them. Now, the

key players of the globalized economy are the knowledge workers who are engaged in professional works undertaking new business enterprises, developing state-of-art technologies or taking the initiative in satisfying various social needs, even if they are working in a big corporation or challenging as an independent entrepreneur. Though needless to say that they are not a volunteer type, those new agents are not necessarily a for-profit type of entrepreneur, but many of them are considered as a social entrepreneur type. This is because sympathetic emotions are required for endure undertaking those creative enterprises subjected to the constraint that they have to survive on their own.

In terms of the concept defined in the first part of this book, they are a new economic power of this age. However, they have not yet been organized into a political pressure group and therefore are not combined with their own political ban guard. The political instability of the modern mass-democracy, which is proved by a high share of the so-called "swing voters" or "floating voters," is caused by the political system comprised of the organized groups belonging to the minority. According to the synthetic propositions of the part one, when a new nation-state in which the new economic power participate as one of the users of the power is established and it can pursue public policies adaptable to the globalized economic division of work, the nation-states revive as a stable societal form.

The List of References

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Appendix

A Hierarchical Game Model of Irrigation Society

In this appendix, an irrigation society is formulated in more detail in the analytical framework of the hierarchical game model developed by Demange (2004). Irrigation-agricultural societies in common are characterized with an irrigation system networked with a canal system. This characteristic is common to both paddy agriculture and dry-field agriculture, and the irrigation-agricultural societies are the place where a state called the early state emerged in the first. However, they were not taken into allowance in the text of this book, when the agricultural communities were formulated in the third chapter of the first part. In this appendix, by examining the politico-economic model abstracted from the essential characteristics of irrigation societies, the insufficiency of the text is made up for. Though an example for the irrigation society is taken from an ancient irrigation-agricultural community, the mathematical structure is applicable to other irrigation societies. The references used in this appendix are put on the reference list in the text part, though it may be an anomaly.

1. An Outline of the Logic

The foreign trade in the Bronze Age put the chieftains of kin-based communities — *clan* in English, *genos* in Greek, *gens* in Latin, *wuji* in Japanese — under a new external circumstance in the sense that the net-benefits of the use of a military force in the transaction of foreign trade were increased by the innovation of bronze-made weapons and tools. If they could adapt to such a new circumstance, they could gain and secure big benefits from the foreign trade the transaction in which, however, had to be carried out under anarchic conditions without any common enforcer. On the contrary, if they had failed to adapt, they might have been colonized or put on the verge of extinction in the worst case. Such an opportunity and a peril drove those chieftains to strengthen the "bargaining power" in the transaction of the foreign trade by adopting a bronze-weapon system. It was a drastic change in the military system from the conventional stone-weapon system

into the one with high lethality. The level of the bargaining power ranges from conqueror status to subject one. The "bargaining power" is an economic terminology to be used as surrogate for, or an equivalent to, the "sovereign power" in terms of politics which is also relative to the sovereign power of other states. The pursuit of the bargaining power drove those chieftains to transform the traditional communities into an "enlarged" social organization armed with a military force. An increase in the size of society was necessary to integrate bargaining process and to bring about scale merits in the production of the means of payment, as well as to maintain such a strong military force as to be able to put the bargaining process at least on an equal footing. Depending on the relative strength of an early king's military forth over neighbor chieftains and kings, an increase in the society size was achieved through an enlargement of the early king's autarky or by way of forming a "star type of networked coalition" consisting of neighbor chieftains and an early king locating at the center of the network. The armed forth was of a private nature, not only in the sense that the aim of maintaining it is to pursue the private benefits of the chieftains but also in the sense that the cost was financed by their own economic and human resources. Therefore, when the net-benefits to a chieftain of an increase in the bargaining power became sufficiently large under an early state, it was brought into existence as a result of the innovation of bronze weapons and tools which motivated those self-interests seeking chieftains to launch into a venturous enterprise, i.e., the transformation of the existing communities into an early state. Though some classical works[1] may be able to inspire us to hypothetically infer this proposition, I inductively derived it on the basis of the recent historical and anthropological works on the external trade of ancient irrigation societies[2] by

[1] For example, see Ortega (1921, 1930), Mommsen (1854), Engels (1888, 1878) and Plato (1941).

[2] As to the historical and archaeological study on external trades between ancient Japan and China, see Asai (2008), Matuki (2007) and Murakami (2007). Furthermore, see Okada (2008, 2004) regarding documental records written by some ancient Chinese dynasties. As to the historical studies on the irrigation systems in Japan, see Tude (2005,1989). As to the classical work

subsuming them in the Kantian categorical frameworks. The main synthetic proposition is corroborated in a deductive way by analyzing the basic model of an irrigation society, which is formalized by the analytical framework of the hierarchical coalition game of Gemange (2004) and by the two-stage bargaining model of Querido (2007). [3]

The categorical approach to the early state is applicable to other types of states *mutatis mutandis*, if we make an explicit distinction among three categories on the states—the substance-accident category, the causality, and the interrelasip.[4] A failure to distinguish these three has brought serious confusions into discussions on the state including the traditional theories of the state. In order to overcome the failure, the main topics of the state—the concept, the causal relation, and the interrelations among other societal organizations—have to be discussed from the view point of the categorical frameworks relevant to each of those topics mentioned above. The relation between the main topics of the state and the categorical frameworks relevant to those topics are summarized below, in turn.

Firstly, the early state should be conceptualized as one accidental form of the society. The society exists as the substance in order to fulfill the purposes common to many individuals, which an individual organ cannot achieve by himself or herself only. Those common purposes are classified into the following ultimate ones: the first is the defense against, or protection from, any violent threat from within and without, the second is the provision of necessities for survival of both an individual organ and its offspring, and the third, though it is a corollary from the above two, is to maintain social institutions contributing to the above two purposes. According to the substance-accident category, the early state is distinguished from the

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on the ancient irrigation societies, see Wittforgel (1957) and Nakashima (1973).

[3] As a special case of the base model, it is applied to Basileus of the ancient Greek. See Wilson (1978) and Ridley (1997) as to reviews on anthropological studies on military actions organized by kin-based communities.

[4] This topic was distinguished by Hegel (1824/1825), when he argued for the organic theory of the state.

chiefdom directly preceding it and the kin-based communities by a difference in the way to achieve those ultimate purposes. In the same way, the early state is discerned from other types of the state.

Secondly, the causality is the categorical framework explicating what factors brought the early state into existence or why and how the early state emerged. It is comprised of the following factors: the existing conditions, the external shock-factors, the motives of main subjects and the results. According to the causality category, the emergence of any form of the society is explained by combining those four factors.

Thirdly, the interrelationship or mutual relationship category is the category to explain interrelations among various societal organizations existing at the same point of time. Based on this categorical framework, the relative nature of the sovereign power and the federalism are derived.

In what follows, the process of building an early state in a paddy irrigation society is formalized from the view point of the above categorical frameworks. Though the historical and archaeological data on which the base model is based are those of the ancient irrigation communities in the Japanese Archipelagos, it is applicable to other irrigation societies including dry-field irrigation societies developed in the river-sides areas developed along the Tigris and Euphrates, the Nile, the Indus, the Yellow.

2. The Historical Backgrounds of an Early State

The chieftains of traditional irrigation communities, who had theretofore already formed an intra-community trading network among those communities, were faced with the foreign trade which could bring new necessities to them. The most influential one is bronze-made weapons and tools, and iron goods later on (heretofore, represented by the term "iron" [5]) into the Far East Asia of those days. These necessities were vital for increasing both of the economic power and the military power. Although at first they might have passively joined in this new trading network, they could

[5] As to the origins of bronze and iron tools, see Muhly (1995).

take advantage of the chieftainship to have exclusive benefits from this external trade. However, whilst the intra-community trades could be under a repeated-game setting firstly because residential areas are stuck to those near irrigated lands and secondly because the military power equipped with stone-made weapons was not so distinguished as to be able to overwhelm others, they had to play with those new foreign traders in a finite-stage game setting on the condition that it is worth to resort to the armed force equipped with iron weapons in terms of the net-benefits. Then, the validity of contracts concluded in each transaction in the foreign trade was doomed to reflect the relative strength of the power to enforce those contracts.[6] In this appendix, the "power to enforce" is called the "bargaining power" which is an economic surrogate for the sovereign power[7] in politics. It could be increased not only by integrating the process of transaction and the production of the means of payment but also by strengthening the military power. It was for the sake of increasing his payoff that chieftains pursued the above two ways to increase the bargaining power. The pursuit after the bargaining power motivated them to coordinate the traditional communities into an enlarged social organ with a regular armed force even at their own expense. As a result, those preceding chiefdom societies were transformed into an early state, and one of the chieftains became an early king, called *basileus* in Greek, *rex* in Latin and *Oukimi* in Japanese. To explain the origins of the early state in such a way based on the above causality is consistent with the "organic theory" of the state,[8] in the sense that both propositions imply that the more organically the

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[6] As to the pioneering work of such a difference between intra-community (domestic) trade and inter-community (external) trade, see Polanyi (1977, 1963).

[7] As to the original concept of the sovereignty, see Bodin (1576).

[8] By "organic model," I refer to the theories of the state argued by Plato, Aristotle, Cicero , Hegel (1824/1825), and Hardin (1995). They are common in arguing that a positive common interest can be given birth only by coordinating the members of a political organization into a networked division of labor functioning like an organic body. It is, in particular, Hegel that brought forth a consistent logic to reconcile the selfish motives to the achievement of a common interest.

members of a society are coordinated, the bigger common interest such as the sovereign power can be achieved.

On the other hand, the cost to a chieftain of forming an early state is for the most part comprised of the cost to maintain his private army, to produce a means of payment for imported necessities and to manage an irrigation system. They were financed by earnings from the external trades and by farm rents. It might have been conventional to view the farm rents as an appropriation or benevolence without equivalent compensation, except for the benefits of protection from external threats. However, as to the farm rent of irrigation society, it should be recognized as farmers' payment not only for benefits obtained from joining in an irrigation system but also for loan of seeds, on the basis of a reciprocal-exchange contract. This point of view on the farm rent is justified on a rational basis, if we take it into consideration that irrigation system is of a club nature and, furthermore, that chieftain of irrigation society had a technological monopoly in the safekeeping and species-improvement of seeds as well as in the construction and maintenance of a large-scaled irrigation system. On the farming workers' side, they could flee to some traditional ways of life such as primitive field-farming or small-scaled irrigation farming. Owing to these options the farming workers had, the chieftain was required to meet their participants' constraints. Accordingly, the process of forming an irrigation society is formalized on a voluntary reciprocity basis. That is why irrigation society can be formalized by a "networked-coalition game with hierarchies" and why its stability in the sense of the core is derived.

Though historical examples above mentioned reflect the characteristics of irrigation societies in the Japanese Archipelago, the base model constructed on the basis of those examples is also applicable to other irrigation societies such as ancient Egypt, Mesopotamia, and China, India, Inca and Sri Lanka,[9] *mutatis mutandis*. Furthermore, they are also applicable to the process of

[9] Gunawardana, R.A.L.H. (1981) as to the early state in Sri Lanka. On the other hand, Maya did not reach the state in the sense that it had been in the Stone Age.

building the "early state" in the ancient Greek,[10] if it is taken into allowance, firstly, that the economic bases of the community are comprised of both dry field farming requiring for management of a canal sytem and cattle-breeding,[11] and secondly that the early king is a "chief among the equals" whose election is much more influenced by *anassein iphi* (rule by forth)[12] than in those irrigation societies, since the chieftains of irrigation societies could also control follower-members by way of social functions represented by the management of irrigation system.

3. Similarities and Differences between the Early State in Japan and Those in the Original Regions

If the early state is explicated on the basis of the categorical frameworks mentioned in the first section, the synthetic propositions on the early state are classified into the three main propositions, summed up below.

Firstly, the early state is one accidental form of the society. Therefore, it is destined to fulfill the ultimate purposes of the society. Those purposes are divided into the following three: defense and protection, provision of necessities, establishing social institutions. The power of the state is called "legitimate", only if those ultimate purposes are fulfilled. A difference in the societal forms lies in a difference in the way to achieve those ultimate purposes. Therefore, the early state should be conceptualized by distinguishing its own ways to achieve those purposes from those of other societal forms.

Secondly, the question, "why and how dis the early state came into being?," is answered by the combination of the following factors: the existing

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10 See Weber (1924) and Finley (1978) as to the early kings of the ancient Greek.

11 The production process is much less characterized with team production than that of irrigation society which is crucially dependent on an irrigation network.

12 Plutarch (1914-54) gives us the image of the early king by way of the mythological stories on Theseus and Romulus.

conditions, the external shock-factors, the motives of main subjects and the results.

Thirdly, the actual validity of the sovereign power is not absolutely but relatively determined in the interrelationship with other societal forms, and is dependent on the relative military power. The main factors determining the military power are military technologies and economic power. The relative military power influences on the interrelationship among various societal organizations existing at the same point of time.

In the text, the early states which emerged the earliest not only in the absolute time but also in the relative time were already examined in accordance with the above categorical frameworks. Therefore, only some differences between those and an early-state building in the Far East region are noted as follow below.

First of all, according to the criteria for classifying a group of the states existing at the same point of time, the early states in Japan are subsumed in the peripheral state. The main external shock-factors are the foreign trade with the neighbor states which were in the process of developing from the early state to an empire type of the state, and the import of metals brought about by the foreign trade. However, the time difference between the bronze ages and the iron ones is short, compared with other regions in which the early states originated. Therefore, it is hard to explicitly distinguish, based on archaeological data, the era of the early-state from that of the chiefdom or from that of the preceding tribe-community. None the less, we can derive not a few interesting inferences, if those empirical works are subsumed under the above categorical frameworks, on the historical era of the tribes, chiefdom, early state and ancient empire.

Secondly, the paddy irrigation-society not only in Japan but also in other East Asian regions is characterized with its members' composition, different from that of dry-field irrigation society. Whilst the latter is comprised of farming members and pasturage ones, the former is of farming members and fishing ones. In the dry-field irrigation society, the transportation and external trade were undertaken by the pasturage members, later replaced by the more advanced ones, called the nomad group. On the other hand, those tasks were

carried out by the fishing members whose economic bases are in the coast and off-shore islands. An interesting difference between those two types of irrigation-society is that whilst the pasturage group had a ruling status in the dry-field irrigation society, the farming group had it in the paddy irrigation society and the fishing group was reconciled to the second status. This difference seems to be caused by a difference in the relative military power.

Thirdly, ancient irrigation societies in common appealed to animism as the means of maintaining its social institutions. The animism fits well to paddy irrigation life, since it functions so as to preserve water sources. The early kings succeeded to the animism priest, and even after the power was taken over by an empire state or by the feudal states, the priest status was entrusted to the descendants of the former early king. This is not only because the preservation of water resources is one of the most important infrastructure of any irrigation society but also because those states appearing on the historical stage later than the early state put the power base on the irrigation farming group.

4. Irrigation Society with Canal system: The Base Model of the First Stage

For the purpose of corroborating the main synthetic propositions on the early state in the paddy irrigation society along the familiar mathematical procedure of inducting from a two-stage game model backwardly, in this section the first stage is formalized as the process comprised of networking an irrigation society and producing and allocating its outputs. The second stage is as the process of the bargaining in a foreign trade. In this first subsection of this chapter, the base model of an irrigation society is set up in the analytical framework of a networked-coalition game. In the second subsection, the price of iron is defined. In the third subsection, the stability of the networked irrigation society is proved by showing the existence of the core. In the fourth subsection, the model of the bargaining process at the second stage is presented and some optimal results of this stage are derived. In the fifth subsection the main results of the two stage game are derived. In the sixth

subsection, the main propositions on the early state are derived.

4.1 Irrigation Society Networked with a Canal System[13]

Irrigation system is economic infrastructure indispensable for any irrigation society, but in order to set up and operate an irrigation system, the members of an irrigation society have to be coordinated into a networked coalition. Furthermore, various kinds of metal tools, represented by iron *en masse*, are vital for an increase in the economic productivity and military power of any irrigation society. However, it has to be procured by way of external trades with foreign counterparts.

In order to construct a formal model abstracted from the essential characteristics of irrigation societies, suppose that a river is flowing down from mountain areas in its riverhead region, and that a canal system for irrigation is set up by taking irrigation-water from one point of the river called *sluice gate*. To be concrete, this canal system is assumed as the following: A trunk canal[14] is constructed which can irrigate prospective n paddy fields, numbered $(1,2,...,n)$ in the order of distance from the sluice gate. I note here that n is generic but not fixed number. This trunk canal can "technically" irrigate any number of paddy fields. Each paddy field is cultivated by one farmer. Those paddy fields are developed and located one by one in line along the trunk canal.[15] In order to take irrigation-water to each paddy field from the trunk canal, each farmer has to construct one branch-canal so as to be connected with it. A chieftain locating in the sluice gate coordinates those

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[13] Refer to Nakashima (1973) and Wittfogel (1957) regarding the details of ancient irrigation systems. As to the irrigation society of Japan, see Tude (1989).

[14] Whilst the trunk-canal system fits well to a multi-layered hierarchical society, a reservoir canal system to a star network. The base model is also applicable to the latter system, *mutatis mutandis*.

[15] Though paddy fields are assumed to be located in line, the model can be extended to the more complex irrigation systems in which each paddy field has its own sub- irrigation systems.

farmers to construct and maintain the trunk canal at the farmers' expense on an equality basis. The total cost of the trunk is denoted by K. The farmers bear not only the equal share in the cost K as an entrant fee on club good, but also the marginal cost of joining in the irrigation system. The latter cost is denoted by $C_i \equiv C(i)$ for i farmer, which is comprised of the cost to construct the i branch canal locating in the i ordered distance from the sluice gate called the *zero* site where the chieftain locates, and of the cost to communicate and transport between the i site and the *zero* site. In this section, the number i is treated as a natural number standing for i farmer, for $i \in (1,2,\dots,n)$. A set of the chieftain and n farmers is denoted by $N = (0,1,\dots,n)$, the first element of which stands for the chieftain. In what follows, the absolute number of the elements of N is defined as $|N| \equiv n$, but not $(n+1)$. In order for a new farmer to join in this irrigation system, his paddy field must locate in the next to the most-distanced site in the existing irrigation system. The cost function of the i branch canal is assumed to be an increasing function of the distance from the sluice gate, with an increasing rate. That is, the more distanced, the more rapidly it increases. These assumptions are formulated by the relations (1) below.

(1) $C_i = C(i)$

$$0 = C(0) < C(1) < C(2) <, \cdots, < C(n), \qquad and$$

$$C(i+1) - C(i) < C(i+2) - C(i+1), \ \forall i \in \{0,1,2,\dots,n\}.$$

The above assumptions on $C(i)$ are justified by assuming the technological characteristics that the further away from the sluice gate a farmer is, the costlier for him to communicate with the chieftain locating at zero site, to bring back loaned seeds and to transport a part of annual harvests for the payment of charges on the loaned seeds and on the consumption of irrigation-water, on the assumption that the cost burden on the trunk canal is omitted.

The trunk canal is constructed by using the "iron" the volume and technology of which are denoted by M *en masse*. They replace conventional tools, i.e., stoneware. Therefore, given a scale of irrigation system, K is

assumed as a decreasing function of M[16] defined by (2).

(2) $K = K(M);\ K(0) > 0,\ K'(M) < 0,\ and\ K''(M) > 0.$

The above assumptions on K are justified, because, if the more of iron-tools replace the existing less-effective tools to construct one set of canal system, the less costly it can become, subject to the "as-usual" assumption on the second derivative.

If the trunk canal is constructed by the cooperative work of s farmers coordinated by the chieftain, the farmer i bears the cost amounting to $K(M)/s,\ \forall i \in (1,2,\dots,s),\ s \leq n$. The burden-bearing above mentioned may appear to mean a slave labor, but in a contractual term, it stands for *entrant fee* or *basic charge* for irrigation system.[17] Crops are harvested after each farmer is engaged in a farming work whose energy expenditure is denoted by e. It is assumed as a constant parameter for all farmers. This assumption is for simplicity but justified by the historical condition where the farmers on those days could not have so much option for leisure. The harvest on each cropland is assumed as an increasing function of the iron, and defined by $f(M), f(0) > 0, f'(M) > 0\ for\ M > 0, f'' < 0$. This function is assumed to be the same for all croplands. A difference in the fertility of each crop land is reflected in the increasing marginal cost of the branch canal, defined by (1). Finally, a fixed percentage of $f(M)$, denoted by $\alpha,\ 0 \leq \alpha \leq 1,$ is paid to the chieftain as *variable charges* for the consumption of irrigation-water and for the loaned seeds and iron tools. It is considered as the contractual expression

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16 Iron tools for construction of canals and for farming were usually lent to farming members by a chieftain.

17 For example, according to the data documented by the centralized monarchy system in the 7th to 8th century, each farmer was liable to do "sixty day work" per year under the supervision of a local chief. This work is considered to be allocated to construction and maintenance of irrigation systems of the local community. On the other hand, each brunch canal is considered to be maintained by a farmer engaged in farming along it.

of the so-called annual tributes.[18]

4.2 Payment for Iron: The Terms of Trade

The iron, M, has to be procured by way of the external trade in which the chieftain or chief (the *zero* player, hereafter) can take advantage of chieftainship or leadership to have a monopoly in the external transaction. According to the historical background, the external trade is classified into the following two cases. In the first case, the external trade is carried on under the existing chiefdom system, and the price of iron is a given P per unit of M, because it is set by the foreign counterpart who is a price-taker. In the second case, the external trade is monopolized by an early king ruling an early state comprised of s farming members, and the price is a decreasing function of s, defined by $\varphi(s)$ per unit of M. The size of a social organization, denoted by s, is taken as a surrogate for the consolidation effects on the bargaining power in the transaction of the external trade, and for the scale effects on producing the means of payment for M and the armed force.

The cost to govern the early state is denoted by $G(s)$ *en masse* that covers the cost of maintaining the regular armed force and that of other administrative work.[19] Here, note that the early state is distinguished form its preceding societal organizations by "rule" of the subjugate territories. In order to indicate the positive effects of forming an early state on the bargaining power in the foreign trade, approximated by $\varphi(s)$, it is assumed

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[18] According to the above document, the tribute from annual harvest, called *So*, was about 3 to 5 per cent of the total harvest. Seeds were loaned at about fifty percent of interests. Payment in other products than paddy crops, called *Cyo* and *Yo*, can be also subsumed in $\alpha f(M)$ for simplicity.

[19] According to the ancient centralized dynasty system called the *Rituryo* system, the regular force was comprised of about 200 thousands military services and the cost of maintaining it was financed by the dynasty government. They were exempt from both payment in cloth called *Cho* and 60 days work for construction called *Zoyo*. These exemptions are considered as a payment to the military servicemen. The cost of constructing roads and metropolis was also financed by taxes.

that $\varphi'(s) < 0$. On the other hand, in order to emphasize the costly nature of maintaining the state aiming at an increase in the bargaining power, it is assumed that $G' \equiv \partial G(s)/\partial s > 0$ and$G'' \equiv \partial^2 G/\partial s^2 > 0$.

Then, the total cost which the zero player bears to acquire M, denoted by Ψ, is defined as follows: $\Psi = \Psi(M{:}P)$, for the existing chiefdom with a given price, P, and $\Psi = \Psi(M, s) = \varphi(s)M + G(s)$, for an early state with s farming members.

In the fifth section, it is justified that $P > \varphi(s)$.

4.3 Hierarchical Networks and Stability

If, in order for a group of members to bring about a cooperative outcome, they have to be *ex ante* coordinated into a cooperative network or a team organization, it is called the "networked coalition with hierarchies".[20] In this sub-section, the cooperative process of the irrigation society set up in the subsection 4.1 is formalized in the analytical framework of a networked coalition game with hierarchies.

The process of forming a hierarchical coalition begins with a two-player coalition and ends with a hierarchical coalition of |N| size, on the condition that the superadditivity is satisfied until the coalition size gets to |N|. The zero-player coordinates other members into a hierarchical network and is at the top of any hierarchy, as long as he is superior to others in managing the irrigation system. Suppose a generic stage of the process, denoted by a networked coalition, S=(0,1,...,s), $1 \leq s \leq n$. Then, the zero-player offers those members the contracts according to which if they join in the irrigation system, they are assured of payoffs satisfying at least the participants' constraints. The clauses of the contracts are classified into the following two types: The first is comprised of the production technology or the means of production he offers and the cost burden of each member. The second is of the interest rates on loaned seeds and the charges on consumption of irrigation-water. The first

[20] As to the details of the concept, see Demange (2004) and Bala and Goyal (2000).

one is represented by $K(M), f(M), C(i)$ and $|S|$. On the other hand, the second is by α. By being abstracted from the common factors, those contract clauses can be condensed into a three-elements set[21], denoted by (α, M, s). For $\forall$s, there exist various combinations of $\alpha$with M. The combination is defined by $\alpha(s) = \{\alpha, M{:}\, s\}$. Denoting a set of $\alpha(s)$ by $A(s)$, $A(s) = \{\alpha(s){:}\, \forall s \leq n\}$. For mathematical simplicity, $A(s)$ is assumed to be compact. It is necessary for those s farmers to accept a contract offer, $\exists\alpha(S)$, it has to meet the participants' constraints and must be feasible. The participants' constraints are defined as the opportunity cost, which is assumed to be zero-normalized. The feasibility condition of $\alpha(S)$, is satisfied, if the total payoffs are nonnegative.

If each of those s farmers accepts a contract offer $\alpha(S)$ which is feasible and meets the participants' conditions, the payoff of the zero-player, denoted by $\pi_0 = \pi_0(\alpha(S))$ and that of $i$farmer, denoted by $\pi_i = \pi_i\big(\alpha(S)\big)$, $\forall i \neq 0$, are defined by (3) and (4), respectively.

(3) $\pi_0\big(a(S)\big) = |S|\alpha f(M) - \Psi$.
(4) $\pi_i\big(a(S)\big) = (1-\alpha)f(M) - K(M)/|S| - C(i) - e,\ i \in S \setminus \{0\}$.

The above payoff functions are defined over the compact set $A(s)$. If, furthermore, S is extended to the domain of positive real number, the payoff functions are also continuous over $A(s)$.

Since the opportunity cost of each player was zero-normalized, the participant's constraints of the zero-player and those of the farmer i are defined by (3)' and by (4)' in turn. Furthermore, on the assumption of transferable utility, the feasibility of $\alpha(S)$ is defined by (5).

(3)' $\pi_0(a(S)) \geqq 0$.
(4)' $\pi_i(a(S)) \geqq 0$.

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[21] Even if α is assumed as a given parameter, it does not influence the main conclusions of this paper, but in what follows, the general formalization is adopted.

(5) $|S| \cdot f(M) - \Psi(M) - K(M) - \sum_{i=1}^{S} C(i) - |S| \cdot e \equiv v(S) \geqq 0.$

$v(S)$ on the right side of (5) denotes the value of the s - player cooperative game. In what follows, both e and $|S| \cdot e$ are deleted without loss of generality.

Since the main assumptions in the above set-up—the superadditivity, the compactness and the continuous utility functions—meet the conditions of the hierarchical coalition game of Gemange (2004), we can prove the stability of the irrigation society along the same mathematical algorism.[22] The stabile nature of the irrigation society is summarized as *Proposition 1*.[23] See Ueda (2011b) as to the general proof.

Proposition 1

The irrigation society is stable in the sense that neither a player nor a coalition has an incentive to deviate from it, on the assumption that the

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[22] The mathematical algorithm begins with the process of the zero-player's maximizing his payoff in forming a two-player network subject to the participant's constraint of a farmer player. Next, in the same way, he forms a three-player network subject to the participants' constraints of two farmers, and etc. The payoff allocations of $(n+1)$ players' network satisfying such a procedure not only meet the participants' constraints of those networked members, but also do not give an incentive to make any coalition deviating from it. Furthermore, it is unique, if the zero-player is assumed as only one coordinator. The basic model can be extended to more complex types of irrigation system, as far as the main assumptions are maintained. For example, each branch canal can have its own hierarchical irrigation systems by extending smaller branch canals from it and connecting them. For another example, a canal system with reservoir is also formalized by a similar model, *mutatis mutandis.* The reservoir system is ubiquitously not only in the ancient irrigation system in Japan but also in the ancient irrigation systems in Sri Lanka.

[23] See Ueda (2011b) as to the general proof.

superadditivity prevails and that utility functions are continuous over a compact set of variables. Furthermore, if the chieftainship cannot be taken over by any other member, then this stable system is unique. If the superadditivity stops at some size, then the society is divided into more than one irrigation systems called "heterarchy" each of which meets the superadditivity.

Proposition 1 not only proves that on the superadditive condition the irrigation society with hierarchies is stable in the sense that no member of the irrigation society has an incentive for deviating from it, but also implies that it is not right to trace the origins of the state back to the fissiparous tendencies of preceding societies, which some evolution archaeologists consider had caused those preceding societies to break up and to form a state.[24]

4.4 The Bargaining Process: A Two-stage Bargaining Game at the Second Stage

Intra-community economic networks in an irrigation society are formed in a repeated-game setting. This is because any irrigation society is not freed from adherence to farmland and because the power to enforce is not so different not only among the members of a community but also among those communities which had to use stone-tools. Therefore, the economic networks among them are spontaneously grown on a voluntary basis and the chieftains of those communities are neither motivated nor capable to unite them into a state maintaining a regular military system equipped with metal tools.

On the other hand, an external trade with foreign counterparts is carried out in the setting of a non-repeated game, in particular, if those foreigners have other options for business connections and are free to shift their options backed up by recourse to the armed forth. In this section, the external trade of iron, carried on without any common enforcer, is formulated by a two-stage bargaining game between a chieftain called "buyer" and a foreign counterpart

[24] For example, see Classen and Saknik (1978, 1981), and Carneiro (1970).

called "seller." It is only through this external trade that the buyer can obtain iron, since it may be too costly to have so strong a regular army as to conquer the seller. On the other hand, he seeks after as an advantageous position as possible in the external trade.

At the first phase[25] of the two-stage bargaining game, the seller offers a supply price, denoted by P per one unit of iron, M. At the second phase, the buyer decides whether to accept or reject it. If he accepts, the contract is concluded and the buyer obtains M at the price of P. On the contrary, if he rejects the offer,[26] the bargaining process enters into a conflict, and is settled so as to reflect the relative strength of the power to enforce. Not only the military power and economic power but also how much effectively the social organization is coordinated into an organic body is crucial for determining the relative degree of the enforcement power. In each homeland, the armed forth may be or not may be waiting behind agents charged with bargaining on the spot. It is those agents including the attendants and transporters that are involved with the conflict on the spot. In any way, the extra cost to the buyer (seller) of exercising the armed forth on the spot is assumed as a given parameter, denoted by $V_0(V)$. However, how the conflict is settled depends on whether the buyer is the chieftain of the preceding community or the king of an early state.

If the buyer is the chief or chieftain of the preceding community, the probability of his winning in the conflict is assumed to be a constant parameter, denoted by λ_0. On the other hand, if the buyer is the "king" of an early state, the probability of winning in the conflict is considered to be more flexible and assumed to depend on the relative strength of the sovereign

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[25] The term "stage" is replaced with the term "phase" in order to avoid the confusion between the" whole game" comprised of the stage of production and the stage of external trade and the "two-stage bargaining game" comprised of the stage of offering and the stage of conflict.

[26] Under the structure of a non-repeated game, the players are exposed to various kinds of risks such as exorbitant overcharge, stealing off proceeds and plundering during transport. When the buyer values the offered price, as a matter of course he takes those risks into allowance.

power he can exercise. The relation among the bargaining power (sovereign power), military power, economic power and their organic combination are formalized by the "Conflict Success Function"[27] (CSF, hereafter).

In the previous section, the number of the players, denoted by s, was defined as a natural number in order to make the explanation suitable to the analytical framework of a cooperative game. However, since differential calculus is required in this section, the space of s is extended to a real number,[28] if necessary. The superadditivity is not assumed in what follows, because the main topic is optimal decision on $\{\alpha, S, M\}$ by maximizing $\pi_0 \; s.t., \pi_i \geq 0, \forall i \in (1,2,\dots,s), s \leq n.$

4.4.1 External Trade of the Preceding Society

If the offered price P is accepted by the chieftain, the seller's payoff function, $\pi = \pi(P)$, and the chieftain's one, $\pi_0 = \pi_0(P)$, are defined by (9) and (9)' respectively, with α, s and M being given at the second stage of the backward induction process. To be simple, in what follows, it is assumed that the seller supplies iron at no cost.

(9) $\pi(P) = P.$
(9)' $\pi_0(P) = s\alpha f(M) - PM.$

It should be noted that all of α, s and M in (9)' are determined at the first stage in the backward induction process, and therefore, that they are given at the second state.

On the contrary, if the price is rejected by the buyer, the bargaining process

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[27] The "conflict success function" used in this paper is defined in the next subsection.

[28] This extension is not a contradiction, since the differential calculus in this section is required to derive the optimal number of the players or society's members of a cooperative game played in the first stage. If the optimal value is not a natural number, the first decimal place is rounded off to the nearest natural number.

proceeds to the second phase of the bargaining game. The condition (10) is necessary for the buyer to choose "rejection" of the offered price P.

(10) $s\alpha f(M) - V_0 > s\alpha f(M) - PM.$

The above condition (10) means that M can be taken away by exercising a force at the cost of V_0 on the spot.

In order to cope with the conflict, the chieftain and the seller expend V_0 and V, respectively. The chieftain wins the conflict with the probability of λ_0. If he wins the conflict, his payoff is given by $\{s\alpha f(M) - V_0\}$. If he loses, he has to pay $P \cdot M$ in return for M, and thus his payoff is reduced to the value of $\{s\alpha f(M) - PM - V_0\}$. Then, the expected payoff of the seller, $\pi(\alpha, s, M: \lambda_0)$, and that of the chieftain, $\pi_0(\alpha, s, M: \lambda_0)$, are defined by (11) and (11)' respectively.

(11) $\pi(\alpha, s, M: \lambda_0) = (1 - \lambda_0)(PM - V) + \lambda_0(-V).$
(11)' $\pi_0(\alpha, s, M: \lambda_0) = \lambda_0\{s\alpha f(M) - V_0\} + (1 - \lambda_0)\{s\alpha f(M) - PM - V_0\}.$

Denote by $P^* \equiv P^*(\alpha, s, M: \lambda_0)$ the maximum of P which the chieftain can accept at the first phase. Then, P^* is determined so as to solve the equation, $\pi_0(P) = \pi_0(\alpha, s, M: \lambda)$. By solving it and arranging the result, (12) is derived.

(12) $P^* \equiv P^*(\alpha, s, M: \lambda_0) = V_0/(\lambda_0 M).$

Substitute (12) into $\pi(P)$ and $\pi(\alpha, s, M: \lambda)$ to compare the results. Then the optimality of $P^*(\alpha, s, M: \lambda_0)$ for the seller is confirmed by the inequality (*) below.

(*) $\pi(P^*) - \pi(\lambda_0) = V_0/\lambda_0 > 0.$

It is obvious from (12) that the higher λ_0 is, the lower is P^* *ceteris paribus*. This *ceteris paribus* causality between λ_0 and P^* induces the chieftain to raise the probability of winning, anyhow. Then, if the probability of winning is

considered to be increased by increasing the military power, and an increase in the military power is brought about by the combination of an innovation in military technology—represented by iron-weapons system—with an increase in the economic power which is approximated by population size, chieftains are driven to transform the existing community into an enlarged social organization with a military system equipped with iron-weapons, with a view to increasing the bargaining power which is the economic expression of the sovereign power. As a result of such an adaption to the historical condition where such a new enlarged societal form assures big gains from the external trade by increasing the military power, an early state came into being in the sense of a peripheral state.

4.4.2 Foreign Trade with Regular Military Force equipped Iron Weapons

Suppose that the zero-player transforms the existing societal organizations into an early state with an increased bargaining power by combining an increased military power and an increased economic power. The cost of governing the early state is denoted by G. It is assumed as an increasing function of the number size of the state's members, denoted by s, with a slope becoming steeper in accordance with the "as usual" assumption on the cost function of economics. That is, $G = G(s), G' > 0 \; and \; G'' > 0$.

On the other hand, it is assumed that the probability of winning in conflict is determined by CSF [29]. It is defined by (13).

$$(13)\ \lambda(s;\theta) = \frac{F(s)\theta_0}{F(s)\theta_0+\theta_1 V} = \frac{F(s)}{F(s)+\theta V}.$$

The above CSF is defined as an increasing function of the "increasing function

[29] As to the original concept of the conflict success function, see Skaperdes (1992). The CSF is also taken as a proxy function measuring a sovereign power.

of s, denoted by $F(s)$," with θ_0 and θ_1 given. The function, $F(s)$, approximates how much effectively those s members are coordinated into a team type of organic body,[30] where $F'(s) > 0$ and $F''(s) < 0$. These assumptions on $F(s)$ are justified, if we take it into consideration, firstly that the personnel and logistic capacity of a regular army must be backed up by both economic resources and human ones—in this appendix, they are a factor of the economic power approximated by the size of society—, secondly that the effects of those two types of resources are subject to a gradually-increasing pattern, and finally that "how effectively those physical factors can function" depends on "how well-organized they are," which is represented by the functional form of $F(s)$.

On the right side of (13), θ is defined as follows: $\theta = \theta_1/\theta_0$, where θ_1 and θ_0 stands for the military technology of the seller and that of the buyer, respectively. It is easy to derive the signs of the first and second derivatives of $\lambda(s{:}\,\theta)$; $\partial\lambda/\partial s > 0$, $\partial^2\lambda/\partial s^2 < 0$; $\partial\lambda/\partial\theta < 0$, *and* $\partial^2\lambda/\partial\theta^2 > 0$.

Here, λ_0 can be redefined as follows: $\lambda_0 = inf_{(s,\ \theta)}\ \lambda(s{:}\,\theta)$. That is, λ_0 is achieved when $\exists(s:\theta)$ brings about the minimum threshold value of $\lambda\,(s:\theta)$.

By contrast, if there exists some s satisfying $\lambda^* \equiv sup_{(s,\theta)}\lambda(s{:}\,\theta) \fallingdotseq 1$, the buyer can acquire M only at the cost of V_0. Then, the buyer's payoff, denoted by $\pi_0(\lambda^*)$, approximates to $\{s\alpha f(M) - V_0 - G(s)\}$. Such an extreme condition seems to be an implicit assumption of the "predatory hypothesis" of the state.

Then, if the offered price P is accepted by the buyer, the payoff of the seller, $\pi(P{:}\,\alpha, s, M)$, and that of the buyer, $\pi_0(P{:}\,\alpha, s, M)$, are defined by (14) and (14)' respectively.

(14) $\pi(P{:}\,\alpha, s, M) = PM.$

(14)' $\pi_0(P{:}\,\alpha, s, M) = s\alpha f(M) - PM - G(s).$

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[30] In other word, $F(s)$ stands for the" coordinated or organized degree of the members of a society argued by Hegel (1924/25), or a combination of the "exchange power" and the "coordination power" by Hardin (1995).

On the contrary, if the buyer rejects the offer, the bargaining process falls into a conflict and proceeds to the second phase of the bargaining process. It is noted here that in order for the offer to be rejected, the inequality condition[31] that $s\alpha f(M) - V_0 - G(s) > s\alpha f(M) - PM - G(s)$ must be met. This condition is formally the same as (10). Then, the expected payoff of the seller, $\pi(\lambda(\alpha, s, M{:}\,\theta))$, and that of the zero player, $\pi_0(\lambda(\alpha, s, M{:}\,\theta))$, are defined by (15) and (15)' respectively.

$$(15)\ \pi\big(\lambda(\alpha, s, M{:}\,\theta)\big) = \big(1 - \lambda(\alpha, s, M{:}\,\theta)\big)(PM - V) + \lambda(\alpha, s, M{:}\,\theta)(-V).$$

$$(15)'\ \pi_0\big(\lambda(\alpha, s, M{:}\,\theta)\big) = \lambda(\alpha, s, M{:}\,\theta)\{s\alpha f(M) - G(s) - V_0\} + \big(1 - \lambda(\alpha, s, M{:}\,\theta)\big)\{s\alpha f(M) - G(s) - V_0 - PM\}.$$

Denoting by $P^{**} \equiv P^{**}(\lambda(\alpha, s, M{:}\,\theta))$ the maximum of the offered price which the buyer can accept, it satisfies the equation, $\pi_0(P{:}\,\alpha, s, M) = \pi_0(P{:}\,\alpha, s, M) = \pi_0\big(\lambda(\alpha, s, M{:}\,\theta)\big)$, or (14)' = (15)', and it results in Eq. (16) in the end.

$$(16)\ P^{**} \equiv P^{**}\big(\lambda(\alpha, s, M{:}\,\theta)\big) = V_0 \,/\, \{\lambda(\alpha, s, M{:}\,\theta) \cdot M\}.$$

Whether P^{**} is optimal for the seller no not is examined by substituting (16) into (14) and (15) and then by comparing the results. The optimality is proved by deriving the following equality; $\pi\big(\lambda(\alpha, s, M{:}\,\theta)\big) - \pi(P{:}\,\alpha, s, M, \lambda_0) = V + V_0 > 0, for\ P = P^{**}$.

When the buyer accepts P^{**}, then, his payoff function is defined by (17) which is derived from substituting (16) into (14)'or (15).'

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[31] In the case of the early state, it is realistic to assume that $V_0 = V_0(s)$, with $\partial V_0/\partial s < 0$. Such an assumption is justified, if we take it consideration that the cost of guards can be reduced provided that the armed force is standing behind. Since the assumption and the consideration can strengthen the causal logic below, it is for simplicity that the assumption of a constant V_0 is maintained in what follows.

$$(17)\ \pi_0(P^{**}:\alpha,s,M) = s\alpha f(M) - V_0/\lambda(\alpha,s,M:\theta) - G(s)$$
$$= \pi_0\big(\lambda(\alpha,s,M:\theta)\big), for\ P = P^{**}$$

4.5 Production and Distributions: the First Stage of the Backward Induction

The first stage of the backward induction is also classified into two cases: In the first case, the zero-player is the chieftain and determines the optimal-value set of $\{\alpha,s,M\}$ which maximizes $\pi_0(P)$ defined by (9)' or $\pi_0(\alpha,s,M:\lambda_0)$ defined by (11)' subjected to the constraint that $P = P^*(\alpha,s,M:\lambda_0) = V_0\ /\ (\lambda_0 \cdot M)$, with λ_0 given and that the participants' constraints of the farmers are satisfied. In what follows, the derived optimal-set is denoted by $\{\alpha(\lambda_0),s(\lambda_0),M(\lambda_0)\}$, and the value of $P^*(\alpha,s,M:\theta)$ substituted by those optimal variables is denoted by $P^*(\alpha(\lambda_0),s(\lambda_0),M(\lambda_0):\lambda_0) \equiv P^*(\lambda_0)$.

In the second case, the zero-player derives the optimal-value set of $\{\alpha,s,M\}$ by maximizing$\pi_0(P:\alpha,s,M)$ for $P = P^{**}(\lambda(\alpha,s,M:\theta))$ defined by (14)' or $\pi_0(\lambda(\alpha,s,M:\theta))$ for $\phi(s) = P^{**}(\lambda(\alpha,s,M:\theta))$ defined by (15)', both of which result in (17) subjecteded to the constraint that $P^{**}(\alpha,s,M:\theta) = V_0\ /\ \{\lambda(s:\theta)M\}$, and that the participants' constraints of the farmers are met. In what follows, the derived optimal-value set is denoted by $\{\alpha(\theta),s(\theta),M(\theta)\}$ and the value of $P^{**}(\lambda(\alpha,s,M):\theta)$ substituted by those optimal values is denoted by $P^{**}(\alpha(\theta),s(\theta),M(\theta):\theta) \equiv P^{**}(\theta)$.

It seems apparent from (16) that if M were set at a given value, then $\partial P^{**}/\partial s < 0$, in any case. This "ceteris paribus causality" between P^{**} and s may lead the zero-player to conjecture that he can make the better terms of trade by an increase in the bargaining power, which requires the transformation of the existing community into an enlarged political organization combined with an increase in the military power. His conjecture turns out right, as proved in *Appendix 2*. That is, even if not only the direct but the indirect effects of s on M are taken into consideration in making the decision at the first stage, the positive effects of an increase in the size of

society on the better terms of trade are preserved. The main results of the backward induction are summarized in *Proposition 2*. (See Ueda (2011b) as to the mathematical proofs).

Proposition 2

On the condition that $C''(s) \geqq K(M) / s^2$, (i),(ii) and (iii) hold.

(i) $\partial M/\partial s > 0, \partial \alpha/\partial s < 0.$
(ii) $\partial s(\theta)/\partial \theta > 0, \partial \alpha(\theta)/\partial \theta < 0, \partial M(\theta) / \partial \theta \geqq 0$
(iii) $dP^{**}/ds < 0, P^*(\lambda_0)M(\lambda_0) > P^{**}(\theta)M(\theta).$

The condition of *Proposition 2* means that an increase in the marginal cost of the irrigation system locating at the marginal site (the s site), denoted by $C'(s)$, is larger than a decrease in the average cost $K(M) / s$, measured by $K(M) / s^2$, which is brought about by incorporating one more farmer into the irrigation system. This condition is justifiable as far as the cost of constructing a branch canal is in the increase at an increasing rate due to, for example, a drastic increase in the transportation cost.

The first inequality of (i) implies that the size of society is positively related to the demand for iron at the optimal. The second one means that the society size is negatively related to the zero-player's sharing in annual crops at the optimal.

The three inequalities of (ii) show the effects of a change in the relative military power of the foreign counterpart on the optimal values; $\alpha(\theta), s(\theta)$ and $M(\theta)$. The implications of each sign are obvious.

The first part of (iii) implies that if the existing communities are transformed into an enlarged social organization with an strengthened military power, the terms of trade are made more advantageous to the zero-player. The second part of (iii) means that in spite of more iron being imported, the total payment for them is smaller under the early state than under the preceding community. This means that the negative effects on the price of imported iron could offset the positive effects on the volume of imported iron.

4.6 The Rational Foundations of the Early State in Irrigation Society

According to *Proposition 1*, the chieftain of the preceding community is not motivated to have the armed force aimed at keeping domestic economic networks in order. According to *Proposition 2*, however, even if it is maintained at private expenses, he may be motivated to increase the military power provided that he can get more profits from the transaction in the foreign trade by resorting to the armed force, the net-benefits of whose use could increase by the innovation of metal goods. An increase in the net-benefits is accompanied with an increase in the size of society which represents the quantity aspect of not only territory but also the economic and military power. Now, we have arrived at the final stage where we have to examine the truth and objectivity of the main synthetic propositions of this paper.

According to the criteria for judging the objective truth of a synthetic but not analytic proposition, the synthetic propositions, if they are derived from unifying or combining the syntheses of various kinds of intuitions and/or categories so as to be subsumed under (or in accordance with) the cognitive frameworks of the pure categories, are "objectively true." The so-called "test of hypothesis" is already implied in these criteria for judging objectivity and truth, because phenomenon or empirical images are abstracted when they are subsumed under the categorical frameworks. (Such an objectivity and truth of a synthetic proposition was called "the possibility of the experience" by Kant). According to the empirical study of neuroscience, such Kantian criteria for judging the objective truth of a synthetic proposition are supported by the "neural modules" theory, which implies that although the question "when all of those modules are set up" has yet to be explicated, Homo sapiens have innately common cognitive-frameworks. This is why regardless of nationality or gender, we think we are persuaded and convinced providing that an opinion or a view is explained along some logical framework. The causality is an example for such a common cognitive framework, let alone sensibility and emotional programs.

However, modern sciences call for revealing explicitly the test of hypothesis

as qualification for truth. According to the procedure of the test, first of all some expected hypothesis should be deductively derived from the analysis of the main proposition. Next, the hypothesis has to be corroborated by experimentation or by reference to relevant empirical data serving as evidence, called the "test." In what follows, the hypotheses are deducted by analyzing the base model.

Before deducting the expected hypotheses as the analytical propositions derived from the analysis of the main synthetic propositions, the three main synthetic propositions of this paper are summarized below.

Firstly, the new circumstances in which metal tools were innovated and their application to a weapons system could increase the expected net-benefits of resorting to the armed force in the transaction of then-prevailing external trade drove the chieftains of the preceding communities to take this opportunity to have much more advantageous position in the external trade, i.e., to increase the bargaining power in the transaction of the external trade by resorting to the armed force strengthened by equipping with metal weapons, on the necessary condition that those chieftains had been steadily throughout motivated by self-interests. Thus, an early state came into existence as a result of adopting metal innovations on the condition that the driving engine-factors had been the selfish motives of those chieftains.

Secondly, the early state is an "accidental form" of the society as a substance and should be recognized not as a creature but as the transformation of the preceding kin-based communities into a new social organ which came into being as an effect of adaption to a change in the essential elements of the preceding type of the society. That change, called a new environment or surrounding, was the metal innovations.

Thirdly, the bargaining power of an early state, the increase of which is the direct goal of those ex-chieftains, is a surrogate for the sovereignty and is interdependent on the sovereignty of other societal organizations. The quantity category such as the relative economic and military power represented by the relative size of society and the quality category such as the organic degree of a social organization and the relative military technology

are the main determinants of the bargaining power.

The first expected hypothesis deducted from the analysis of the main propositions is as follows: that when faced with some new surrounding to be adapted, i.e., faced with the innovation of metal goods, the chieftain prefers an "early state type" of the society to the existing type of the society called the "preceding community just prior to it," on the condition that as the main driving-engine factor to bring about a change in the essential elements of the preceding community, he can take this opportunity to satisfy the innately-programmed self-interested motives by increasing his payoff.

The second expected hypothesis is as follows: the pursuit of the direct goal of the chieftain, i.e., the pursuit of an increase in the bargaining power in the foreign trade, led to the establishment of an early state as the end result, whether conscious of its historical implications or not. This second hypothesis is simultaneously proved in the process of the deductive proof of the first one.

The third expected hypothesis is as follows: that an increase in the bargaining power is consistent with an increase in the payoff of the chieftain, and therefore, that with given external factors such as the opponents' military technology, the actual degree of the sovereignty of an early state is determined so as to meet the condition of maximizing his payoff. The deductive proof of this hypothesis is also addressed in the process of the proof of the first one. Thus, we can concentrate on the deductive proof of the first hypothesis in what follows.

For the purposes of deriving the above-mentioned hypotheses, it is enough to prove that the inequality (18) or its rewritten form (19) holds. Either way, it leads to the conclusion that the chieftain in the Metal Age prefers an early state to the existing societal form.

(18) $\pi_0\big(P^{**}(\theta)\big) = s(\theta)\alpha(\theta)f(M(\theta)) - \frac{V_0}{\lambda(\alpha(\theta),s(\theta),M(\theta):\theta)} - G(s(\theta))$

$> \pi_0\big(P^{*}(\lambda_0)\big) = s(\lambda_0)\alpha(\lambda_0)f\big(M(\lambda_0)\big) - \frac{V_0}{\lambda_0}.$

(19) $s(\theta)\alpha(\theta)f\big(M(\theta)\big)\hat{} - s(\lambda_0)\alpha(\lambda_0)f(M(\lambda_0))$

$$> G\big(s(\theta)\big) - \{\frac{V_0}{\lambda_0} - \frac{V_0}{\lambda(\alpha(\theta), s(\theta), M(\theta):\theta)}\}.$$

The inequality (19) holds, if there exists a set of factors which lead to (19) by satisfying some or all of the following three conditions,(i),(ii) and (iii): the condition (i) that an increase in the share of annual harvests, i.e., the left side of (19), is large enough, the condition (ii) that $G(s(\theta))$ is small enough, and finally the condition (iii) that $\lambda(\alpha(\theta), s(\theta), M(\theta):\theta)$ is large enough relatively to a given parameter,λ_0.

Whilst the left side of (19) means an increase in the "tributes" to the king, obtained by transforming the existing community into an early state, the right side means an increase in its net cost. Therefore, both of (18) and (19) mean that in order for the chieftain to prefer an early state to the existing community, the net benefits to the chieftain of transforming into an early state must be positive. Let's examine the conditions for the positivity of the net-benefits below.

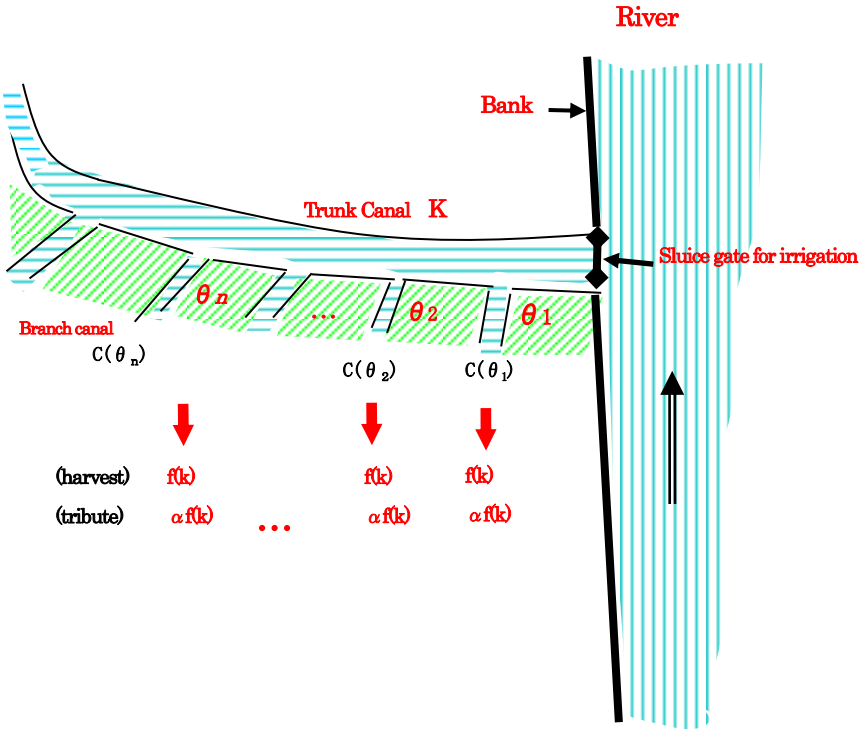
The second term on the right side of (19) is positive because$\lambda_0 < \lambda(\alpha(\theta), s(\theta), M(\theta):\theta)$. If this positive second term is so large as to cause the inequality (19) to hold always, then the first hypothesis turns out to be proved. However, when we take it into consideration that $G(\theta)$ is usually large, a change for the better in the terms of trade, defined by $\{V_0/\lambda_0 - V_0/\lambda(s(\theta):\theta)\}$ on the right side of (19), must be so sufficiently large as to satisfy the inequality (19). When the left side of (19) is large enough, the dependence of the required positivity of the chieftain's net-payoff on the better terms of trade is weakened. However, though both the inequality, $s(\theta) > s(\lambda_0)$, and the first part of (i) of Proposition 2 can contribute to the positivity of the left side of (19), the positivity itself of the left side cannot be proved, because how α changes is not obvious. On the other hand, as the left side becomes smaller, the right side must become smaller, too, in order for the net-payoff to continue to be positive.

Based on the relations inferred in the above paragraphs, the following

conclusion is derived: If there exist a range of the set whose elements consist of an increase in the chieftain's share in the annual harvests, the cost of governance and an increase in the bargaining power and which can meet the inequality condition (19), the chieftain prefers the early state to the preceding community. However, if not, for example, if an increase in the chieftain's share in annual harvests is not so large and/or the cost of governance, $G(s)$, is not so small enough as to always assure the inequality (19), an increase in the bargaining power, approximated by $\{1/\lambda_0 - 1 \,/\, \lambda(\alpha(\theta), s(\theta), M(\theta): \theta)\}$, must be large enough in order for the chieftain to prefer the early state to the preceding community and therefore, for him to be motivated to transform the latter into the former as the end result. On the other hand, the actual degree of the bargaining power or that of the sovereignty is relatively determined in the sense that it is determined so as to meet the optimality condition of the maximization of his payoff. However, thanks to his direct motives for its increase, the bargaining power is sure to be higher in the early state than in the preceding community.

In any case, the early state in irrigation societies, even though it is the peripheral type, came into being in the historical circumstance in which an increase in the net-payoff gained by an increase in the military power can exceed the cost to govern enlarged territories with an increased size of the subjugate members. This conclusion is essentially the same as one the main synthetic propositions of the evolutionary theory, which explicates what the early state is and why it came into being.

An Illustration of Irrigation System



Assumptions on the Irrigation System

The marginal cost of the irrigation system: $C(\theta_1) < C(\theta_2) < \ldots < C(\theta_n)$

The fixed cost of trunk canal: K = K (M), K' < 0 and K" >0

Harvest per Cropland: f(M), f'>0 and f'<0

M:= provision of ironware, standing for irrigation technologies

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