

This work is distributed as a Discussion Paper by the  
**STANFORD INSTITUTE FOR ECONOMIC POLICY RESEARCH**

SIEPR Discussion Paper No. 05-13

**Mechanisms of Endogenous Institutional Change**

By

Masahiko Aoki  
Stanford University

March, 2006

Stanford Institute for Economic Policy Research  
Stanford University  
Stanford, CA 94305  
(650) 725-1874

The Stanford Institute for Economic Policy Research at Stanford University supports research bearing on economic and public policy issues. The SIEPR Discussion Paper Series reports on research and policy analysis conducted by researchers affiliated with the Institute. Working papers in this series reflect the views of the authors and not necessarily those of the Stanford Institute for Economic Policy Research or Stanford University.

---

# Mechanisms of Endogenous Institutional Change

Masahiko Aoki

Stanford University

**Abstract:** This paper proposes an analytical-cum-conceptual framework for understanding the nature of institutions as well as their changes. In doing so, it attempts to achieve two things: First, it proposes a way to reconcile an equilibrium (endogenous) view of institutions with the notion of agents' bounded rationality by introducing such concepts as a summary representation of equilibrium as common knowledge of agents. Second, it specifies some generic mechanisms of institutional coherence and change -- overlapping social embeddedness, Schumpeterian innovation in bundling games and dynamic institutional complementarities -- useful for understanding the dynamic interactions of economic, political, social and organizational factors.

## ***1. Introduction***

A consensus seems to have emerged among economists, as well as among other social scientists, that 'institutions matter', for understanding the differences in economic performances among various economies over time and space (e.g., Nelson and Sampat, 2001; the World Bank, 2002). But, if institutions are nothing more than codified laws, fiats, organizations and other such deliberate human devices, why can't badly-performing economies design (emulate) 'good', institutions and implement them? This question would naturally lead us to a more fundamental, ontological question of what institutions are. Institutions are customarily identified with the 'rules of the game' by economists and others (e.g., North, 1990:5). However, within this thrust, their nature, origin, and relevance to economic analysis are seemingly treated in two ways.

One treats various institutions as rules in a hierarchical order. According to this view, there are rules exogenously pre-determined outside the domain of economic transactions, such as legal rules and social norms, while economic institutions such as contracts (markets), organizations and hybrids are regarded as rational transaction-cost-saving responses within those constraints (North,

---

This paper is a revised version of an invited lecture at the 2005 World Congress of the International Economic Association in Morocco. It also draws on my previous book, *Toward a Comparative Economic Analysis*, 2001, MIT Press. I am grateful to referees of the paper for their stimulating and thought-provoking comments and criticisms.

1990; Williamson, 2000). Also, pure theorists working in the fields of social choice and mechanism design (e.g., Gibbard, 1973; Hurwicz, 1996) examine a related normative question of whether the rules of game with some socially desirable properties can be designed prior to the operational playing of the game by actual players of diverse orientations.

The other view is to treat institutionalized rules as something spontaneously and/or endogenously shaped and sustained in the repeated operational plays of the game itself. Hayek (1976) and Schotter (1981) are thought of as pioneers in this regard among economists, while various recent game-theoretic approaches to identify institutions with some kind of equilibrium outcome are considered attempts to provide an analytical foundation for this view (e.g., Greif, 1997, 2006; Aoki, 2001; Young, 1998; Calvert, 1995; Dixit 2004). Running the risk of oversimplification, let us refer to the first view as the exogenous view of institutions and the latter as the endogenous view.

The focus of this paper is on institutional change as was suggested at the beginning. It will try to examine how the two views deal with the various issues related to it. Which view provides a more appropriate framework for understanding institutional change? Alternatively, are these two views reconcilable or complementary to each other, or should each of them be modified after taking an account of the other's merits?

In order to deal with these and other issues, we start out by making rather stark, static, game-theoretic characterizations of the exogenous and endogenous views of institutions. Then, we incorporate an aspect of bounded rationality of the agents to the endogenous view, formalizing the notion that the agents may not know details of other agents' intentions in the game in which they are in, but hold a common perception about salient features of the ways by which the game is being played (Section 2). An institution thus conceptualized is essentially endogenous, but appears to be an exogenous constraint to the agents. However, one sharp contrast between the two views may still remain in that, while the exogenous view takes a dichotomy approach to separate the rule-making game and the operational game,<sup>1</sup> the endogenous view takes an integrative approach. We deal with this difference in two steps: First, we introduce four prototypes of the domain of game in which social norms, political states, economic contracts and organizational architecture may potentially evolve respectively as multiple equilibria, thus leading to a variety of institutions (Section 3); and then proceed to an examination of possible linkages and interdependencies, rather than a hierarchical ordering, among institutions across those domains. Specifically, we provide

---

<sup>1</sup> For various treatments of the dichotomy approach, see Levi (1988), Hurwicz (1996), Amable (2003).

game-theoretic treatment of such intuitively-attractive notions as institutional complementarities, social embeddedness, and institutionalized linkages -- as instances of equilibrium phenomena (Section 4). However, these static treatments can not confront squarely the question of how the agents form a common perception of the basic game-situation, thereby leading to the selection of an associated institution out of the possible many. In order to consider this question, we move to dynamic considerations. We first discuss what factors are likely to trigger a crisis of an existing institution and then try to understand how the bounded rational agents can transit to a new institution, by focusing on the process in which they revise their individual expectations about how the game is to be played and eventually reach a modicum of common expectations with the help of ideological and entrepreneurial factors as well as past legacies (Section 5). Section 6 conceptualizes the dynamic counterparts of institutional linkages and interdependencies across domains – dynamic institutional complementarities, overlapping social embeddedness, and Schumpeterian bundling innovation. In these mechanisms social, political, economic and organizational factors interact rather than they operate in unidirectional manner. For example, a consequence of the political-exchange-game (i.e., a policy) may affect an institutional framework of the economic-exchange domain, but institutional changes in economic and organizational domains may also affect the institutional structure of the polity. Section 7 concludes.

## ***2. Institutions as Shared Behavioral Beliefs cum Endogenous Rules of Game***

In order to make a conceptual distinction between the exogenous view and the endogenous view of institutions, first in sharp contrast and then as reconciled, we will introduce the notions of ‘game-form’ and game. The game-form is expressed as a pair of the domain and the consequence function defined on it. The *domain* is further composed of the sets of activated action choices of all the agents who are mutually relevant in certain kinds of interactions (economic, political, organizational or social). With each profile of all the agents’ action choices [and each state of nature uncontrollable by them], the *consequence function* specifies particular (physical) consequences of concern to some or all the agents [contingent on the state of nature].<sup>2</sup>

---

<sup>2</sup> The terminology ‘game-form’ due to Gibbard (1973) is distinct from the classical notion of the game defined as 3-tuple of the set of players, the sets of action choices facing them, and the sets of pay-off functions. Indeed, a game-form is a game with no individual utilities yet attached to possible consequences and is meant to capture only the objective parameters of the game.

The set of agents may include not only natural persons but also organizations such as the government, corporations and the court, depending on context. The set of a particular agent's action choices can be conditioned by his/her mental state, personal development, acquired skills and the like in the case of a natural person, and by the accumulated collective know-how, scope of collective attention and so on in case of an organization. Formally, an agent's set of potential action choices can be thought as being infinite, but only finite ones of them are regarded as activated for a period of time because of the limits of individual capacity. Other aspects of the individual agents' bounded rationality will be introduced later in this section and in section 5. Until then let us be satisfied with saying that only a limited list of finite action choices is actively considered for choice by each agent. The consequence function can be conditioned by available technologies, formal rules with specific rewards or penalties to particular actions (such as laws and fiats), and other relevant external factors (such as institutional parameters in other domains as specified later). Thus, the game-form can be considered fixed for a period of time, but should be viewed as historically conditioned. As pointed out by Field (1981), it is not possible to construct a completely history-free game-form.

Suppose, given a game-form, each agent tries to choose an action (or more generally a plan of actions, each one contingent on an evolving event of the domain) that (s)he considers the most suitable according to his/her own preferences, given his/her expectations about others' choices and associated consequences. The 'maximization' of preference may be taken to imply that he/she incorporate only his/her own hedonic utility into consideration but also genetically-programmed altruistic concerns, sense of appropriateness and the like.<sup>3</sup> Thus the agents in the domain can be conceived of as the players of the game with the *formal rules* of the game specified by the consequence function. From now on, therefore, we will use the word agents and players interchangeably. Viewing social interactions among agents as a 'game' should not be regarded as idiosyncratic to mathematical game-theorists who have developed elaborate analytical tools. Such a view, albeit informally, can be traced as far back as to the writings of Adam Smith (1759), as well as to those of prominent scholars of trans-disciplinary orientations, such as Hayek of later years (1988) and Braudel (1958).<sup>4</sup>

---

<sup>3</sup> The recent development of evolutionary psychology suggests the existence of genetically programmed altruism. For economists, Field (2001) is a good introduction.

<sup>4</sup> Adam Smith refers to 'the great chessboard of human society (in which) every single piece has a principle of motion of its own, altogether different from that which the legislature might chuse to

The reason why we introduced the utility-independent game-form prior to the explicit reference to the game is that it is useful for pinpointing the differences in the exogenous and endogenous views of institutions and the implied nature of institutional change in the literature. For example, we may distinguish:

- *An institution as a game-form:* As noted already, the neo-institutionalists like North (1991, 2005) identify institutions with formal rules such as constitutions, statutory laws, and contracts, as well as informal rules such as social norms. Those rules may be considered representable in a game-form, i.e., with specifications of the parameters of the consequence function as well as ‘permissible’ constraints on the sets of agents’ action choices (Hurwicz, 1996). One well-discussed problem with this view is how these rules are enforced (see Greif, 1997; 2006). They may be enforced by particular organizations such as the court or social sanctions, but then the question can be raised as to how the enforcer(s) is motivated to enforce the specified rules, which leads to the infinite regression of who enforces the enforcer(s), who enforces the latter, ad infinitum. Another question, related to the above, which we focus on in this paper, is that of who formulates the formal rules and how this is done. The neo-institutionalists consider that formal rules reflect the cultural/ideological belief system of agents, particularly that of the influential and powerful. It filters agents’ information processing and can be ‘changed by fiat’ (see for example North, 2005: chapter 5). In other words, they visualize a kind of hierarchical ordering in which the political structure (and the social structure in the case of social norms) formulates rules for the economic domain (e.g., Williamson 2000, Levi, 1988). But then how are the rules of the polity (and social norms) constructed? Are they formulated endogenously in the polity (and through social
- *An institution as an endogenous equilibrium outcome of the game:* A clue to solution to the problem of infinite regression, as noted above, can be provided by endogenizing the enforceability question. Suppose that all the players, including the enforcer of the rules,

---

impress upon it.’(1759: 234) For Hayek, see the appendix E of Hayek (1988), in which he stated that ‘(t)he practices that led to the formation of the spontaneous order have much in common with rules observed in playing a game.’(154) See also Hayek (1976:71 and n.10). Braudel, the foremost scholar of the French *Annales* School of History, made an interesting suggestion on the possibility of ‘qualitative social mathematics’ as tools for comparative and historical analysis, as well as for crossing lines of different social science disciplines. He admitted that this idea was inspired by ‘the games of Von Neumann and Morgenstern’. (Braudel, 1958/1980: 38-52)

responds with the best action choices given their respective information regarding possible events [characterized by the state of nature and over-all pattern of action choices by all the agents]. If and only if agents' action plans and beliefs become mutually consistent and repeatedly implementable, then (salient features of) those plans may be regarded as an endogenously constructed, sustainable (enforceable) rule of the game, and thus as an institution. Similar ideas have been entertained by various authors, using diverse specifications of the game and associated concepts of equilibrium. However, how can agents, presumably bounded-rational in information processing, find mutually consistent choices? Do they need to know all the details of evolving events, each time when they arise, in order to arrive at mutually consistent choices? What are relationships between formal rules represented in the game form and rules of game endogenously constructed? In the equilibrium approach, how can the notion of institutional change be entertained? By the gradual change of an equilibrium in response to changes in the parameters of a game form? Or, by a qualitative, endogenous shift in equilibrium a la Schumpeter? If so, what could cause a quantum jump in equilibrium?

The differences between the two views, as they stand, may appear sharp. However, let us try to gradually explore a way to reconcile them.<sup>5</sup> We will do this step-by-step by considering the interactions and interdependencies of games across domains and over time. As a first step, we introduce a concept of an institution that we are going to rely on, modifying the equilibrium view by incorporating an aspect of the bounded rationality of individual agents: the limit of analyzing the objective structure of game.

Let us begin with a little bit of formality. We assume that agent's information structure is represented by an information partition of the set of possible profiles of agents' action choices which may be referred to as an event.<sup>6</sup> That is, if an agent cannot distinguish one event from others, those events may be grouped into the same cell of his/her partition. We allow that agents may have different partitions. That is, some agents may be more (less) informative than others'

---

<sup>5</sup> See Greif (2006) for an ambitious treatment of synthesizing various notions of institutions including cultural beliefs and 'internalized beliefs' regarding relationships between an action and a consequence independent of others' action choices.

<sup>6</sup> We are adopting here the event-based, Aumann approach to modeling information structure. See Fagin et al (1995: Chs 1-2). Osborne and Rubinstein (1994: Ch.5).

in the sense that their partitions are finer (coarser). Also, some of them may be more informative about a certain type of events in being able to distinguish possible events more finely in that type, but not so in other types. Although agents' information partitions may be thus various, we assume that they are correlated. Rather loosely, in this situation the *common knowledge* of all the agents may be defined as what even the least informative agent knows. We assume that there exist multiple equilibria relative to the described information structures [we can extend this definition to the case where agents' choices are contingent on the state of nature<sup>7</sup>]. Since the common knowledge is about partition of the space of events, i.e., expectations of all the agents as regards strategic choices of all other agents [contingent on state of nature], we may also refer to it in the spirit of game theory as the shared behavioral beliefs. Below, we use the word 'common knowledge (of the rule of game)' and 'shared behavioral belief' interchangeably.

We now propose the following conceptualization of an institution.

*An institution is composed of common knowledge regarding salient features of equilibrium plays of the game out of the many possible, held as the players' shared behavioral beliefs about ways in which the game is being repeatedly played.*

In every day language, an institution is salient, self-sustaining features of social interactions, held as the common knowledge of all the agents about ways in which they are to act/not act (contingent on the evolving state). It can be regarded as rules of the game endogenously constructed and self-sustaining.

A few caveats are immediately due. Although we implicitly assume the existence of a particular equilibrium allowing for endogenous common knowledge [i.e., correlated equilibrium in which agents has correlated beliefs], the same idea may be applicable to various equilibrium concepts (such as sub-game perfect equilibrium, evolutionarily stable equilibrium, mixed strategy Nash equilibrium and so on) in specific context. The equilibrium concept is nothing but an

---

<sup>7</sup> Let the combination of a state of nature and a profile of action choices by all the agents be an event. Although agents' information partitions of the set of these events may be various, assume that they are correlated. That is, if an agent can distinguish the event A and B and assigns the probability  $p_1$  and  $p_2$  to them respectively, for an agent who cannot distinguish them, the probability assignment to the event  $\{A, B\}$  is  $p_1 + p_2$ . In this situation, the *common knowledge* of all the agents may be defined as in note 7, with probability density assigned to each cell of the partition. In this case, equilibrium may be characterized as 'correlated equilibrium' (Aumann, 1974). The set of correlated equilibrium contains the set of mixed strategy Nash equilibrium.



analytical representation of self-enforceability, or self-sustainability, of a strategic profile; each player behaves rationally given his/her incomplete information regarding possible events. Such definition allows for a multiplicity of equilibrium, or equivalently a variety in the institutionalized patterns of human interactions. If unique equilibrium existed, it would be just a mechanical transformation of natural factors beyond the analytical foci of the social sciences.<sup>8</sup>

In order for all the players' action choices to become mutually consistent and sustainable (thus in equilibrium), each player need not know the details of the other players' intentions and choices. In addition to relatively fine, idiosyncratic information relevant to their own choices – such as 'the knowledge of particular circumstances of time and space' (Hayek, 1945), it is sufficient for the players to share knowledge or behavioral beliefs summarizing the possible consequences of certain types of their own actions *via others' reactions*. Such knowledge or behavioral beliefs may normally take the rule-form: 'If I do such and such, then others (or, a particular focal agent, like the court, government, etc.) will act in such and such a way (so that such and such a consequence will fall on me).' Some sociologists (e.g., Meyer and Rowan, 1977; Powell and DiMaggio, 1994; Scott, 1955) regards a shared cognitive framework the essential element of institutions, such as the 'schema' to be relied on in the process of information processing or the 'scripts' guiding agents what to do in certain circumstances. Also some philosophers like Searle (1995: 2005) regards 'collective linguistic and symbolic acceptance' as the essential element of institutions. These non-economic views and the game-theoretic view of institutions proposed above may not be entirely mutually exclusive, but complementary, although the former tend to emphasize 'desire-independent' (Seale, 2005) aspects of institution. Indeed, a recent achievement of the theory of knowledge indicates the logical equivalence between the partition approach to knowledge (Aumann, 1976) and the Krepke (1963) approach which associates "a primitive proposition" for each possible event. (Fagin et al: Proposition 2.5)

In any case, an institution dictates agents how to do under certain circumstance in terms of linguistic and symbolic representation or rule. But in order for such a scheme, script or rule can constitute a behavioral belief to be shared, sustained and relevant, it needs to be consistent with, and confirmed by, the agents' repeated choices. For example, the agents can be deterred from importing legally prohibited goods, if they believe that 'if I smuggle, I am likely to be caught by

---

<sup>8</sup> The multiplicity was emphasized by Sugden (1986) as a precondition of the equilibrium conceptualization of conventions.

the enforcement officer and penalized according to the law'. However, if it is widely observed that many agents are able to import the goods by bribing the law enforcer and thus escape a punishment, this belief will not be sustained. The unenforceable law is hardly qualified to be an institution, but the practice of bribing corrupt law enforcers does qualify.

The institution as defined possesses some subtle, dual characteristics. First, there is an endogenous/exogenous duality. Once established, the institution may appear to be an exogenous external constraint for each individual agent in his/her choices of actions that are beyond his/her control. In the above example, there can be at least two equilibria and accordingly two institutions: an institution of the rule of law and an institution of bribery. If the rule-of-law institution prevails, then compliance with the law would appear to be imperative for an individual agent to avoid a penalty. An attempt to smuggle legally prohibited goods by bribing the enforcement officer would appear to be futile (except as a random drift tending to be absorbed into an equilibrium). Alternatively, in the bribery institution, an attempt by an honest enforcement officer to enforce the law may be frustrated. However, if either of the institutions is to be sustained, corresponding beliefs need to be continually reconfirmed and reproduced through relevant strategic plays of the players.<sup>9</sup> Thus, we essentially subscribe to the endogenous view, but it can also be thought of as incorporating some aspects of the exogenous view because of the endogenous/external-dual characteristic of institutions.

Second, there is an objective/subjective duality. The institution exists as an objective reality because its validity can be tested by an actual choice. For example, the objectivity of the belief that smuggling will be punished can be tested and experienced by actually violating the law. On the other hand, unless it constitutes the internal beliefs shared by all the players, any social rule may be irrelevant to their action choices and thus may not be institutionalized. For example, even when the objective existence of a statutory law in the books is unquestionable, if nobody believes it to be implementable or enforceable, it will not prevail as an institution. This dual characterization indicates the difficulty of changing an institution just by enacting a law or issuing a fiat. A law may certainly change agents' expectations, but whether they will yield a sustainable outcome consistent with the original intention of the legislature cannot be taken for

---

<sup>9</sup> This exogenous/endogenous duality was the focal point of the phenomenological approach to the sociology of knowledge by Berger and Luckmann (1966).

granted, unless it constitutes a collective mind-set.<sup>10</sup>

The third duality is a constraining/enabling one. An institution constrains each player's action choices through beliefs implied by it. Indeed, North once defined institutions simply as 'humanly devised constraints that shape human interaction.' (1991:3) However, an institution also enables the bounded-rational, information-processing-ability-constrained agents to arrive at mutually consistent choices in an information-saving manner. This is somewhat analogous to the situation in which the perfectly-competitive equilibrium market prices are supposed to summarize information regarding the preferences and technologies facing market participants in the most information-efficient way (they represent the marginal rates of substitution and transformation) for sustaining Pareto-efficient equilibrium (See Hayek, 1945; Koopmans, 1957; Hurwicz, 1960). Each market-participant only needs to know competitive prices, of which dimension equals the number of goods minus one (with one particular good serving as the numeraire). A difference between this approach and ours exists, however, in that what is implied in an institution is not a summary representation of exogenous data of the game such as technology and preferences, but a summary representation (beliefs) regarding how the game is to play at equilibrium. Each player may collect information and form expectations regarding other players' choices and intentions in a manner idiosyncratic to his own choices. Therefore there may be wide differences and variety in how finely their information sets are partitioned in the space of strategic profiles. However, each player cannot, and need not, know the choices of all other players in their entirety. It may be sufficient for them to share some rough ideas regarding how the game is repeatedly played in terms of institutions plus some localized knowledge of the game. Being guided by such information, bounded-rational agents can economize on information processing and still arrive at mutually consistent choices, although there is no guarantee whatsoever that its outcome is the most efficient one as a Walrasian equilibrium or even a Nash equilibrium.<sup>11</sup> However, we can also say (1) that, the more informative the agents become, there would be an equilibrium by which some agent(s) become better off without making

---

<sup>10</sup> North points out that '[b]elief systems are the internal representation and institutions the external manifestation of that representation.' (2005: 49) However, North seems to refer to cultural beliefs and the like on this point, while we remain at this point referring only to the beliefs in the usual game-theoretic sense, i.e., 'expectations' about ways the game is being played. We relax this restriction towards the end of the essay.

<sup>11</sup> As implied by note 7, correlated equilibrium may not necessarily be Nash equilibrium.

anybody worse off (but there could be another equilibrium without such property); and (2) if there is a device to pool agents' information to make the joint information partition more finer, there would be an equilibrium with the same property.

The following diagram may be helpful to represent the dualistic natures of an institution. However, this diagram also presents us with a dilemma. It shows both that a shared behavioral belief is a prerequisite for equilibrium plays and that a shared behavioral belief is a summary of the equilibrium outcome at the same time. They cannot be determined simultaneously, however.<sup>12</sup> We suggest ways to deal with this dilemma in a context of institutional formation (transition) later.

Figure: An institution as shared behavioral beliefs  
*cum* endogenous rules of the game

About here

### ***3. Prototypes of Domain and Associated Proto-Institutions***

So far we have imagined the generic game played in an abstract domain of which the parameters are represented by the game-form. We have conceptualized an institution arising as a summary representation of an equilibrium outcome of the game. However, actual institutional dynamics appear to involve interactions of economic, organizational, political, and social factors.<sup>13</sup> As a first step toward the analytical treatment of such an interactive process, this section will attempt to specify prototypes of domains that may capture some minimally-essential elements of those interactive factors. The following section will then try to capture the nature of the interactions among those factors in the contexts of the games across those domains.

---

<sup>12</sup> This is a variant of the so-called common knowledge problem. (Lewis, 1969)

<sup>13</sup> More generally, one may conceive of types of domains that 'intersect' with other domains and generate cultural values and beliefs, although the ways in which such domains can be analyzed in terms of a game with a broader concept of 'strategies' have hardly been explored. See Hayek (1976) who referred to the need to learn from an insufficiently appreciated work by the historian J. Huizinga (1949) about 'the role of play in the evolution of culture.' For an interesting non-game-theoretic exploration on the co-evolution of culture and civic society, see Ikegami (2005: Chs 1 and 2). Greif (2006) analyzes relationships between cultural values and institutions in reference to the game-theoretic framework.

Let us consider the following four prototypes of the domain distinguished by types of players and types of interactive choices. We note for each of them a unique problem that must be solved in order to sustain interactions (exchanges) and the proto-types of institutions that may arise in response to such challenge. As noted already, although it is attempted to formulate them in a primitive form as much as possible and identify possible institutional elements as something endogenously emergent, it is inevitable that some primitive elements of institutions are already implicitly presupposed in their definitions.

- *The economic exchange domain:* This is the domain in which transactions of private goods take place.<sup>14</sup> The most primitive type is the domain composed of only two agents who can potentially repeat the transactions over time. As Hicks once noted, even the simplest exchange of this type is essentially a ‘contract’: making the agreement to exchange, delivery one way, and delivery the other. ‘Trading is trading in promises.’(Hicks:1969) How can this bilateral promise be assured and fulfilled? This is essentially the problem of contract enforcement. As well known the simplest institution that can arise in response to this problem is the reputation mechanism, called trust: the mutual beliefs that the default on a contract will be penalized by the other party to refuse to exchange in the future. However, if transactions may not necessarily been repeated between a fixed pair of players but among a large number of (mutually unknown) players, an effective self-sustainable reputation mechanism may not be feasible any more, because the information necessary for identifying and penalizing past cheaters may become increasingly difficult to disseminate. This difficulty can anticipate a solution that can only be facilitated by the emergence of a third party mediating information dissemination and/or enforcing contracts across multiple exchange domains, leading to the notion of linked games to be discussed in the next section. There can be a variety of such third party, ranging from the Law Merchants (Milgrom, North and

---

<sup>14</sup> The institution of (customary) property rights is already presumed in making the exchange of private goods the object of analysis, even if its third party enforcement is not. A still more primitive domain than the economic exchange domain could be that of common goods where private ownership is not defined yet. The problem unique to this type of domain is the ‘tragedy of commons’ due to the over-consumption of the goods and/or the shirking of efforts to sustain them. If it is technologically feasible to exclude particular players from the domain, then self-sustainable institutions such as the establishment of customary property rights, collective norms of consumption and efforts of maintenance and the like, may cope with the problem.

Weingast, 1990) to the state to digital rights management (e.g., auction websites, certification authorities), and not necessarily limited to the state (see Aoki, 2001:Chapter 4; Greif. 2005).

- *The organizational exchange domain.* The organization may be a player of the game in an economic-exchange domain.<sup>15</sup> At the same time the organization itself may be regarded as emerging as an institution in the domain of work collaboration in which some goods may be produced by joint efforts by more than three persons.<sup>16</sup> A peer-team may emerge as a most simple institutional form of collaborative efforts, but as a seminal contribution by Alchian and Demsetz (1950) argued, the presence of a third party may become soon essential for more complex work collaboration. But informational problems in collaborative works calling for an asymmetric organizational form may not necessarily be limited to the need of monitoring of moral hazard problems (shirking) inherent to collaborative works, but also involves the economies of specialization between centralized management and operative tasks in information-processing necessary for collaborative works. A simple organizational architecture beyond the primitive peer-team may therefore be conceptualized as one in which the agents are divided into two classes: the helmsman (super-ordinate, manager and the like) and the at-least-two operatives (subordinates, workers and the like).<sup>17</sup> The former formulates the collective objective, decomposes the collective task for achieving it into modular tasks and assigns each of them to a particular operative together with the provision of incentives/penalties. The operatives respond with cooperation/non-cooperation in assigned tasks. However, aspects of interactions within this prototype domain may not necessarily be exhausted as a mere bundling of economic-like exchanges of incentives and acceptance of commands (cooperation). In order for an organization to formulate and pursue collective objectives, complex information exchanges will take place between the helmsman and the

---

<sup>15</sup> North (1991, 2005) emphatically argues that the organization is a player of the game, but not an institution defined as the rules of the game.

<sup>16</sup> The presence of at least 3-persons seems to be essential for an organization to evolve as an institution. Although economics often analyzes a prototype organization as in terms of a two-person contact, we consider that it is essential to regard the organization as at least a 3-person game. The 2-person collaboration may be indistinguishable in essential aspects from 2-person economic exchange or 2-person commons.

<sup>17</sup> The terminology 'helmsman' is due to Arrow and Hurwicz (1960).

operatives as well as across the operatives. Indeed, an organization can be regarded as an information system linking the agents. Through interactions among the agents, a certain pattern of information exchange associated with a particular incentive structure can be institutionalized.<sup>18</sup> But there can be a variety of institutionalizable patterns (Aoki, 2001:Chs. 4 and 5) and we will see that which of these patterns to be actually institutionalized may well be conditioned by ways in which the collaborative work interacts with other domains.

The two prototype domains introduced above have traditionally been the objects of study in economics, business economics and organization theory, while political and social factors have been taken as the given environments in those analysis. However, recently there has been a growing awareness among social scientists that there are actually important interactions between economic domains, on one hand, and social and political factors, on the other. In order to capture these interactions and possible institutional linkages between them, we first conceptualize the following two prototype domains.

- *The political exchange domain.* Let us presuppose that this domain in its prototype is composed of two types of agents: the government and multiple private agents. This asymmetric structure is somewhat similar to that of the prototype organization emerging in the collaborative work domain. They are different, however, in that in the organization the members have the option to participate or not, but in the political exchange domain the exit option is not open to the private agents. The government can provide public goods to the private agents (the protection of property rights, rights to live and so on) in exchange for the extraction of costs in the form of taxes, issuing of money, etc. But the fact that the government has such power may also imply that it has power to transgress the various rights of the private agents (the so-called ‘fundamental dilemma of political economy’ due to Weingast (1997)). The private agents may respond by supporting/resisting/submitting-to the government’s choice (protect/transgress) with/without mutual coordination among themselves. Even in this simple game structure a variety of different equilibria can arise, depending on ways in which coalitions between the government and particular private agents, as well as those among the private agents, are formed. These equilibria can be identified as institutions of the ‘state’

---

<sup>18</sup> Such a pattern may be thought of as corresponding to the ‘routines’, in the evolutionary framework of Nelson and Winter.(1982). Also see Nelson and Sampat (2001)

(Aoki 2001: Chapter 6).<sup>19</sup> The English words ‘stable’, ‘state’ and ‘institution’ are all said to have been derived from the same Latin word ‘status (standing condition)’. Thus it seems to make sense semantically to conceptualize the ‘state’ as a political institution to be a stable equilibrium in the political exchange domain. Aoki (2001, chapter 6) derives a variety of prototype states, such as the liberal state, corporatist state, developmental state, bureau-pluralistic state, predatory state as multiple equilibria from a structure-wise isomorphic game-form.

- *The social exchange domain.* This domain may be conceptualized as the one in which social symbols (languages, rituals, gestures, gifts, etc.) that directly affect the payoffs of players, such as esteem, emotional rejection, sympathy, benign neglect, and so on, are unilaterally delivered and/or exchanged with ‘unspecified obligations to reciprocate’, sometimes accompanied by gift-giving (Blau, 1964). Institutions that arise in this type of domain are identifiable with social customs and norms enforced by the threat of social ostracism from the domain, gradational rankings (stratification) of prestige/social status among the agents, etc. (See Coleman, 1990; Aoki, 2001: Chapter 8). Norms are taken as exogenous rules for the ‘economic exchange’ game in the North-Williamson framework, but their production and reproduction may be susceptible to game-theoretic analysis, to which we will discuss more shortly.

We have identified four prototypes of domains. However, an equilibrium of the game, and consequently an institution, may not either arise and be sustained in a single domain independently of other domains. Also, institutions arising in different domains may not be hierarchically aligned in such a way that social norms precede a political institution, while decisions made in the context of a political institution determine the forms of institutions in economic and organizational domain. Rather, institutions may arise encompassing different domains, as well as institutions in different domains may co-evolve through complementary relationships, leading to a complex structure of over-all institutional arrangements. We now turn to this structure.

---

<sup>19</sup> Greif (2005) refers to equilibria in the political domain as ‘coercion-constraining institutions’.



#### ***4. Analyzing Institutional Linkages across the Domains***

In this section we discuss possible institutional inter-linkages across domains using game-theoretic apparatus. One of the important advantages of the game-theoretic approach to institutions indeed lies in the possibility that the intuitively appealing and plausible notion of institutional interdependencies, coherency and path-dependencies is made analytically tractable rather than presented as an ad hoc presumption. From the game-theoretic perspective, there can be two types of equilibrium linkages and thus institutional linkages: linked games and strategic complementarities. They enormously expand equilibrium possibilities as well as make multiple, non-Pareto-optimum equilibria inevitable, thus leading to the possibility of diversity of over-all institutional arrangements.

***Linked games:*** Games are ‘linked’, if one or more players coordinates his/her own choices of strategies across more than one domain so as to gain more pay-offs than the sum that could be possible from playing separately in each of these domains. The reason for this possibility is that by doing so these players can benefit from externalities such that possible gains in one domain can be transferred to another to sustain some strategic profile that would not be profitable in isolation. Thus, equilibrium possibilities can enormously expand. For example, suppose that there is a commons domain where agents who misuse the commons (abuse, shirking of maintenance efforts, and the like) cannot be excluded from using them for technological reasons so that the reputation mechanism cannot be implemented. However, if the members of the commons domain all belong to an identical social exchange domain where large social surpluses can be created by cooperation in rituals, festivities, assistance in times of private hardships and the like, then misbehavior in the commons domain can be punished by ostracism in the social exchange domain (Aoki, 2001: chapter 2.2). This is an instance where the reputation mechanism may become self-enforcing by linking games on different domains, even if players are short-sighted and/or cannot be excluded in one of those domains. Specifically, the tragedy of commons can be controlled when the commons domain is embedded in a tightly-knit social exchange domain. Essentially the same mechanisms are found in a variety of situations such as: the quality of natural environment is protected by the community of citizens who share the same values; open-source software is developed by free contributions by individual engineers who aim to enhance their professional reputations, etc.

This type of linkage mechanism corresponds to the sociological notion of ‘social embeddedness’ due to Granovetter (1986). It is particularly worth noting that the author made an explicit reference to the endogeneity of norms as well as their strategic nature from a sociological perspective. He argued that ‘agents in markets and organizations in the modern society generate trust and discourage malfeasance by being embedded in concrete personal relations and structures (networks).’ However, the norms and values are not a one-time influence but an ongoing process, continuously needing to be constructed and reconstructed through interactions. In other words, values and norms may be perceived as exogenously received by individuals, but actually they are endogenously shaped by them ‘in part for *their own strategic reasons*.’(57. Italics by the present author) As mentioned, linking games generally expand equilibrium possibilities. Thus, the commonsense notion that differences in social norm lead to a diversity of institutional arrangements is indeed provided with a logical foundation.

Another type of linked games of institutional relevance can be found in the *bundling* of multiple, similar or disparate domains. For example, a single employer can bundle multiple employment contracts with workers. Then an equilibrium may emerge that can elicit a higher level of effort from each worker than would be possible under a single isolated contract, because the threat of terminating a contract with a worker who shirks and replacing him/her with another becomes more credible, provided that the employer has a pool of potential workers and can prevent collusion among the employed workers (Murdock, 1996). The economic exchange domains thus bundled are then transformed into a prototype of an organizational domain as defined above.

A somewhat similar example is found in the financing of multiple entrepreneurial projects of a similar type by a single financier (venture capitalist), with the arrangement of not continuing to finance those projects judged to be performing unsatisfactorily. In spite of multiple financing costs, bundling of multiple contracts may be beneficial to the financier not only because they can broaden future options in the presence of high developmental uncertainty (Baldwin and Clark, 2002), but also because it can elicit higher efforts from entrepreneurs through the threat of termination due to bad performance, or equivalently through the enhancement of probability of continued finance due to better performance. But in order for this to be true, the identification of badly performing projects must be made precisely, while the prize for a successful project must be very high. The possibilities of the option value and externalities created by the tournament-like competition are considered two fundamental institutional features of the entrepreneurial competition as observed in Silicon Valley (Aoki and Takizawa, 2002).

Examples in the above paragraph are about bundling by a single player internal to each of the bundled domains of similar types (the employer, the financier).<sup>20</sup> Bundling may also be institutionalized by a third party external to domains. Suppose, for example, that the reputation mechanism cannot sustain honest exchanges (mutual contract compliances) between two anonymous traders because they are not expected to meet again. However, if multiple domains of this sort are bundled with an intermediary who can disseminate information regarding the past contractual compliances of the agents, the two-person reputation mechanism can be effectively replicated, provided that honest information processing and dissemination by the third party can be motivated by his/her own reputation concerns. The Law Merchants (North, Milgrom and Weingast, 1990), credit bureaus, escrow services, on-line certification authorities and auction-sites are examples of such third parties. It is important to note that third parties in bundling are by themselves strategic players and they should be treated as such in an analysis of institutionalization. Still more complex linked games exist between domains of different types. As suggested, the organizational exchange domain may internally generate particular modes of information-systemic and organizational-architectural characteristics. But those characteristics may not be sustainable in isolation. The members of the organization, the helmsman and the operative alike, may also be active agents in other domains (such as financial, labor and political exchange domains) and coordinate their own internal and external strategies. As a result, a complex institutional structure, known as corporate governance, may evolve across those domains (Aoki, 2001: Chapters 11-14).

***Institutional complementarities:*** In linked games each agent or a particular agent coordinates his/her own strategic choices across domains and generates a single institution (equilibrium) therein. Alternatively, we can conceive of the possibility that, even if agents may not consciously coordinate their own choices across domains, they regard an institution in another domain as a parameter and accordingly choose strategies in their own domains, and vice-versa. In such situations, institutions evolving in each of these domains may become interdependent and mutually reinforcing. This intuition can be game-theoretically warranted. Suppose simply that  $x'$  and  $x''$  are two alternative institutions (equilibrium outcomes) in domain X, while  $z'$  and  $z''$  are two alternative institutions in domain Z. Suppose that the pay-off difference  $U(x') - U(x'')$  increases for all the players in domain X (they do not need to have the same pay-off function), when  $z'$ , rather than  $z''$  prevails in domain Z.

---

<sup>20</sup> An example of bundling of different domains by a single player internal to all of them is also found in 'linked contracts' in land-leasing and financing in the developing economy. See Bardhan (1977).

By the same token, suppose that the pay-off difference  $V(z') - V(z'')$  increases for all the players in domain Z (they may be partially or totally overlapped with those in domain X), when  $x'$ , rather than  $x''$  prevails in X. Then the games in X and Z are said to be super-modular, and  $x'$  and  $z'$  (alt.  $x''$  and  $z''$ ) are said to complement each other. If the super-modular condition holds, then an equilibrium combination, and a viable over-all institutional arrangement, can be either  $(x', z')$  or  $(x'', z'')$  (Topkis, 1978; Milgrom and Roberts, 1990; Aoki, 1994, 2001: Chapter 8). Further, even if one of them is less efficient in terms of Pareto-ranking, it may still prevail as an equilibrium, once it is achieved (Aoki, 2001:225-9).

This is a powerful and useful analytical tool for institutional analysis. First, as just mentioned, it explains why there can be a variety of over-all institutional arrangements across economies, even if the economies face the same types of domain characteristics (such as technologies or common markets connecting them), as well as why a sub-optimal over-all institutional arrangement can persist in some economies while a better institutional arrangement is viable in others. Second, institutional complementarities are not necessarily conditional on consensus among agents in domain X regarding the absolute ranking of  $x'$  versus  $x''$  (i.e., it is not required that  $U(x') - U(x'') > 0$ ). Only a weaker agreement in the direction of change in their pay-offs associated with a parametric change in  $z$  matter. Thus an over-all institutional arrangement may emerge and become sustainable even if there is a conflict of interests among the agents about the absolute preference for a component institution in isolation.

For example, suppose that the manager prefers retaining the exclusive rights of managerial prerogatives over work within his/her own firm, but wages are set by an industrial collective bargaining agreement and its results are enforced over the entire industry by the corporatist state, as in Germany, rather than through individual/firm-specific contracts. Then the manager's dislike of workers' participating in work control through co-determination and/or the works council may be mitigated, because yielding a partial control of rights to the workers may substitute for the missing pecuniary incentives. Then the work council in the organizational-exchange domain and the corporatist state in the political-economic exchange domain would become institutionally complementary to each other, while the combination of exclusive managerial prerogatives and the liberal state (in the sense of government non-interference in private employment wage contracts) would become another possibility (Aoki, 2001: Chapter 11.2).

### ***5. How Bounded Rational Agents Deals with the Institutional Transition***

Even if the nature of the over-all institutional arrangements can be understood in equilibrium terms, it does not mean that institutions will not change. Change will occur when there is a substantial equilibrium shift. However, as we have conceptualized an institution as a summary representation (i.e., common knowledge) of the salient features of equilibrium, gradual changes in equilibrium as a passive response to continual changes in the parameters of the game-form may not immediately be reflected as an institutional change.<sup>21</sup> In that sense, institutions can be robust and inertial even if the environments of the game, as well as individual agents' choices, change to a certain extent. On the other hand, institutional changes, i.e., large changes in agents' knowledge, are not to be explained or characterized as having the so-called "sunspot equilibria" property either: those induced by purely 'extrinsic uncertainties' leaving economic fundamentals intact (Prescott and Shell, 2002). Large exogenous changes in initial endowments are sometimes cited as an instance of such extrinsic uncertainties, but implicit in the distribution of initial endowments is an institution of property rights (Field, 1981) so that its change needs to be endogenously and/or explicitly explained. According to our conceptualization, changes in institutions are to be characterized by quantum shifts in equilibrium constellation of strategies by the agents such as to generate, as well as induced by, substantive changes in agents' shared behavioral beliefs. Then, when and how does such a quantum change in equilibrium occur? In this section, we consider the generic nature of institutional transition. We will argue that aspects of the agents' bounded rationality plays essential roles in this process (otherwise, equilibrium change will be gradual or only have sun-spot properties.) Some basic mechanisms of institutional change involving equilibrium-shifts encompassing multiple domains are discussed in somewhat more concrete settings in the next section.

First, suppose there is a fairly stable situation of plays of the game, that is, one in which an institution as the shared behavioral beliefs is unchanged while the game is being played. Namely, although the objective game-form may be continually changing in terms of the set of participating players, their activated choice sets, and the parameters of the consequence function (formal laws, technologies, environments of the game, etc.), the agents only marginally adjust their action choices in the belief that the over-all characteristics of the ways in which the game is being played will remain the same nor does their experience refute their beliefs. Also 'mutant'

---

<sup>21</sup> Technically, even if information partitions of the space of events by individual agents change marginally, their meet (common knowledge) may not be altered, or change at most marginally.

players may exist who, mistakenly or intentionally, deviate from equilibrium play, i.e., who are satisfied with sub-optimal behavior. But as long as such drifts remain in a sufficiently close neighborhood of equilibrium (technically, in the basin of attraction of equilibrium), the summary representation of equilibrium common to all the players, thus an institution, will remain intact.

Indeed, the situation in which institutions are stabilized is not characterized by agents' complete knowledge regarding the game structure, i.e., the game-form and other agents' preference structures. For each possible choice from the activated menu of his/her own action choices, each agent can expect a certain consequence with the help of institutions summarizing others' equilibrium responses, in addition to localized knowledge of the game-form intimately relevant to his/her own pay-offs. Then (s)he may make a choice that would produce the highest satisfaction to him/her within this institution-induced, individualized information structure. In this process, even a large portion of the set of objectively feasible action choices may be automatically removed from active consideration of choice. The individually-tailored, truncated game-forms complemented with the common knowledge of institutions may be referred to as the *institution-induced, individual game models*.<sup>22</sup> They simplify the objective game structure, but can be more informative to individual agents in the sense of specifying only information sufficient for individual choices in the currently prevailing situation. They are not exogenous data of the game structure available for agents who are capable of super-rational calculations to achieve Nash equilibrium. They already contain salient features of endogenous outcome of the game, but in turn serve as a support of continual reproduction of them.

Now consider explicit changes in the objective game-form. They may be changes in the activated sets of individual choices due to the accumulation and development of skills, learning, technological-innovation-induced new action possibilities, and so on. Or, they may be changes in technological and environmental conditions that result in different physical consequences for the same action choices. They may be new laws or rules which are enacted as consequences of the game in the political domain, but appear as changes in the parameters of the consequence

---

<sup>22</sup> The institution-induced game-model is roughly a renamed version of what I called the 'subjective-game model' in Aoki (2001, Chapter 8). But as the term 'subjective game' is used in other contexts by Kalai and Lehrer (1995), I adopted the new term. Note that it roughly corresponds to the notion of 'mental models' in the induction theory of Holland *et al* (1986). They conceive of mental models as models of the problem space "that cognitive systems construct, and then mentally 'run' or manipulate to produce expectations about the environment." (*ibid.*,; 12). But our conceptual framework emphasizes the inter-linkage of those models among agents through their common perceptions of institutions.

functions in other domains. Note that, although these changes have been conveniently conceptualized as parametric shifts in the game-form so far, they may be actually regarded as endogenous in the sense of being induced through the repeated plays of the game and thus patterned by them. Therefore Greif (2006) aptly calls the parameters of the game-form the ‘quasi-parameters’ (although he does not employ the concept of the game-form explicitly).

Also, as the patterns of plays structured by institutions repeat themselves, the cumulative consequences of repeated plays may start to generate internal inconsistencies and/or endanger the sustained compatibility with the environments. They may be evidenced by the depletion of the natural environment and stock of natural resources, the obsolescence of some skills, the revelation of attractiveness of under-utilized skills, increasing frictions within the institutional orders of external domains (including foreign markets) and the like. In such situations, mutant strategies that have been suboptimal thereto may exhibit an increasing viability. Also, searches for, and experiments with, new types of strategies consistent with the emergent situation may be initiated. In other words, some agents may try to expand their sets of activated choices with greater energy. When deviations from the existing patterns of playing occur beyond a certain threshold, individual perceptions about ways in which the game is, and should be, played become problematic. Shared behavioral beliefs become de-stabilized, signaling the crisis of institutions.

In such crisis situation, competition can arise between searches for new types of playing on one hand and efforts to preserve the existing pattern of playing on the other. Or, even if an overt conflict does not arise, agents may not be in agreement on the direction in which direction the play of the game should be changed. In any case, the mutual bonds through institutional stability can be lost. If such a crisis situation persists, political contests may become harsher in the political-exchange domain; economic depression may hit a certain segment of the economic-exchange domain; and a sense of anomie may spread in the social-exchange domain. In order to restore political stability, economic development opportunities and social bonds, institutions of shared behavioral beliefs will need to be reformed. How can this be accomplished? Especially, given the many unforeseen alternatives, how can one particular institution out of the many possible eventually be selected? Shared beliefs as social constructs may be generated sometimes spontaneously or in a decentralized manner, but often with a guide of a ‘focal point’ (Schelling, 1960). The well-know problem of common knowledge (i.e., how the players acquire shared behavioral beliefs) can be resolved by reckoning that the salient features of equilibrium as to form an institution may have precedents in the *ex ante* beliefs of

some agents during the process of institutional crisis and reconstruction. They may take various forms, depending on the nature of the domain, inter-relationships across domains, etc.

For example, the same pattern of social norms may facilitate the emergence of new patterns of behavior in other domains by embedding them. In the organizational domain, entrepreneurial agents may be engaged in creating a novel mode of bundling various productive activities with their own predictive beliefs in its viability and profitability, emulated by the others afterwards. Alternatively, it may be a charismatic leader or a political organization in the political-exchange domain that advocates a particular normative belief and associated policies. Here, the entrepreneurial 'predictive' belief and political 'normative' beliefs can be distinguished from endogenous, 'shared behavioral' beliefs that constitute an institution because the former are beliefs held *ex ante* or advocated only by a partial set of agents prior to the formation of an equilibrium. The competition among them in impacting the patterns of action choices characterizes the transitional process. However, it may not be a straightforward process that a particular 'belief' becomes a focal point for the convergence of behavioral expectations and thus implied patterns of behavioral choice becomes prevalent and equilibrated. The process may be highly complex, depending on how learning, emulation, adaptation, reinforcement, resistance, and inertia interact across economic, political, organizational and social exchange domains. For example, even though entrepreneurs experiment on a new model of organizational architecture that may fit a new technology, it may not become viable, unless complementary changes occur in labor and financial markets. Even if a change in the law is introduced as a consequence of a political leader's active initiatives in the political domain, the ways in which it impacts other domains may not be straightforward and an unintended outcome may result.<sup>23</sup> In next section we will discuss some of the basic interactive mechanisms that condition the

---

<sup>23</sup> An interesting example of such case may be found in the evolution of the Japanese main bank system and associated institutional arrangements in the 1950s (Aoki, 2001: chapter 13). Its emergence may appear to have been initially affected by policies and organizational designs set by the military government before and during the Pacific War (e.g., credit control through banks, restraint of stockholders' control in corporate governance domains). The initial intention of the government was to strengthen the governmental control over the economy conducive to the enhancement of war-related production. This purpose failed to be fulfilled. One reason why the main bank system nevertheless evolved eventually can be that the vector of policy and organizational design were continued to be set in the same direction in post-war democratic reforms and subsequent periods (e.g., the removal of capitalist control in corporate governance through *Zaibatsu* resolution), but more fundamentally, it can be that there were strong complementarities between emergent organizational practices based on organizational information-sharing, on the one hand, and relational financing and associated corporate governance structure, on the other. This outcome was far from what the military government initially intended.



direction of institutional change.

The transitional process converges when and only when (i) with the help of a system of predictive and/or normative beliefs that have guided agents' learning, their expectations regarding how the game is being played converge in their essential features and become stabilized; and (ii) agents' new action choices based on such expectations generate satisfactory pay-offs to them without a big surprise.<sup>24</sup> That part of behavioral expectations common to all the agents then emerge as a new institution. The transitional juncture of institutional evolution come to an end and another spell of relative institutional stability will be initiated. As a remark in the previous section regarding institutional complementarities suggests, even at the time of institutional emergence, a prevailed advocacy need not be unanimously accepted as the best social choice. Disagreement may remain among agents, but once a pattern of action choices consistent with the advocacy becomes prevalent, the agents will be better-off by acting in compliance with it.<sup>25</sup>

## ***6. Mechanisms of Cross-Domain Institutional Change***

Toward the end of the last section, we hinted at a few possible mechanisms of institutional change. In this section we will try to make their nature explicit as a qualitative equilibrium-shift and examine the ways in which they are susceptible to analytical understanding. Specifically, we examine the dynamic counterparts of the linked games and institutional complementarities, as discussed in section 4, that is: (1) Schumpeterian innovation in bundling; (2) social embeddedness encompassing sequentially arising domains, and (3) dynamic institutional complementarities, or the co-evolution of institutions across domains. For each of these, a few examples are given. They may appear anecdotal at first, but are susceptible to rigorous game-theoretic analysis in terms of context-specific game models.

***Schumpeterian innovation in bundling:*** As suggested already, bundling can arise when there is a possibility of rents accruable to the bundling agent, either through new information or the

---

<sup>24</sup> These two conditions are meant to imply a fixed point property that (salient features of) equilibrium is common knowledge among the agents, and thus an institution, if and only if all the agents know that the institution is reliable and that implied behavioral beliefs are shared.

<sup>25</sup> North argues that "[w]hen conflicting beliefs exist, the institutions will reflect the beliefs of those (past as well as present) in a position to effect their choices' (2005:50)

externalities he or she has created. In the dynamic context a new type of bundling becomes viable when an old established type disintegrates from an internal crisis, or, as is more likely, a new type encroaches or destroys the rents accruable to the old type through its innovation. Thus, the institutionalization of a new type of bundling may not necessarily be smooth. A vigorous thrust of Schumpeterian entrepreneurship may be required to pursue the creative destruction of old combinations (Schumpeter, 1934/1947).

One example is the emergence of the clustering of small entrepreneurial start-up firms in Silicon Valley and other high technology centers. They have emerged as a result of the unbundling of business activities integrated within the organizational architecture of the traditional integrated firm. In the traditional integrated firms (e.g., old IBM, GM) business activities, such as design, manufacturing and marketing, were bundled under the umbrella of a single corporate headquarters. Design activities themselves were modularized and organized in a hierarchical manner, starting from the centralized conceptual design of an integrated product system at a higher level, to an analytical design, to the detailed designs of modular parts, to a manufacturing process design, to the manufacturing of a pilot product and, finally, to its improvement at a lower level. In contrast, Silicon Valley start-up firms tend to be specialized in modular product design and possibly in the production of pilot products targeted for particular niche markets. Other activities, such as large-scale manufacturing and marketing, are beyond their immediate scope.

As already pointed out, these entrepreneurial start-up firms compete with each other in specific niche markets for the innovative design of modular products. The winner in each market is likely to be acquired by leading firms in markets of a broader range (such as Cisco Systems, Intel, and Microsoft), whose aim is to form an innovative product-system. Thus, from the viewpoint of product-system innovation, the system integration of component technologies is evolutionarily realized by the *ex post* bundling of selected modular products developed by entrepreneurial firms, in contrast to the *ex ante* bundling of comprehensive design activities within the framework of centralized planning of a single integrated firm (e.g., the development of IBM/System360). Clearly, the former type of bundling, referred to as A&D (acquisition and development) in contrast to the traditional intra-organizational R&D (research and development), is more flexible in keeping alternative options open until the uncertainty involved in viable system-design is reduced. The cost of running this Schumpeterian process is the duplication of development efforts by multiple competing entrepreneurial firms before interim and ex post selection is complete. However, we have already pointed out some technological and institutional conditions under which the expected

benefits (the option value and tournament value) from this new mode of organizational architecture become more than enough to compensate the costs. It is implied that, although the technological merit of this organizational architecture in coping with the design and production of a complex product system is clear, it would not have become institutionally viable, if its emergence had not been accompanied by the complimentary co-evolution of flexible markets for engineers' mobility as well as venture capital markets.

Another example is business groups internalizing trading companies that often emerge in developing economies as a means of enforcing contracts when the rule of law by the state has not yet been firmly established. However, as professional competence in designing, agreeing upon, and enforcing contracts becomes more readily available, the relative economic value of the trading company in mediating intra-group transactions may gradually decline. Even when the institutional value of the grouping gradually erodes though, a new group may strive for survival in pursuit of the monopoly rents that are the result of exclusive bundling. An institutional change from corporate grouping to more open contractual relationships governed by a third party (such as the court) is likely to involve a Schumpeterian entrepreneurial challenge, countered by political, economic and social resistance from the old group.

***Overlapping social embeddedness:*** Let us imagine that the choice set of the agents potentially includes all physically possible action choices (possibly of infinite dimensions), but that the player activates only his/her small subset of finite dimensions as a 'repertoire' (Dosi and Marengo, 1994) of actual choices at any point in time. In general, the player can change this repertoire over time by adding new choice possibilities and deleting those that have become obsolete in response to changes in his/her own physical and mental states shaped by training, experience, perception of the external world, etc. However, the speed of this change can vary depending on the domain. The choice possibilities open to agents can change relatively slowly in the social-exchange domain, while those in the organizational exchange domain may change more quickly, because the organizational architecture is susceptible to design competition among entrepreneurs subject to constraints imposed by complementary institutions (such as labor and capital markets). Thus it is possible that the same pattern of choice profiles in the social-exchange domain can become linked with different choice profiles in other domains. In other words, the same types of social norms can

embed different types of domains over time in an overlapping manner.<sup>26</sup>

For example, consider the opening of exchange opportunities with outside merchants facing a rural community in the pre-capitalist period, where the social norm of cooperation in the management of the commons, such as the irrigation system, had prevailed. Until the resurgence of institutional economics in the late twentieth century, various social science disciplines, including economics, sociology and anthropology, tended to draw a sharp line between community relationships in the pre-capitalist economy and market relationships in the capitalist economy (e.g., Polanyi, 1944). But the presence of community norms as an institutional device to promote and sustain cooperation in the rural community can facilitate, or deter, its transition to a market economy, contingent on its prevailing historical conditions (Aoki and Hayami, 2001). In some cases, the presence of community norms can serve as a transitory mechanism of contract enforcement in the underdevelopment of the rule of law governing the economic exchange domain. It does so by facilitating collective punishment on breaches of contracts by merchants from the outside, while restraining their own members' breaches through peer monitoring in order to preserve their collective reputation to outside markets.

Another example is the evolution of small firms clustering in the Italian Industrial Districts. They were begun by small enterprises in the garment industry that emerged after the highly integrated textile companies failed because of high wages and labor disputes in the 1960s, finally the highly protective Workers' Statute adopted them in 1970. Skilled workers released from large companies were encouraged to establish their own enterprises, often by purchasing equipment from large companies that were closing (Barca *et al*, 1999). The types of transactions and coordination that quickly developed among these firms, such as the reciprocity of subcontracting and sharing of productivity-enhancing knowledge, would not have been feasible without mutual trust as an essential governance mechanism. Their development was possible because the transaction domain was embedded in a pre-existing social exchange domain. The new owners of these small firms had already invested a significant amount of social capital -- social surplus derived from their individual reputations in the social-exchange domain as members of the civic community and/or labor organizations that had confronted the old integrated companies.

***Dynamic institutional complementarities:*** The concept of static institutional complementarities has

---

<sup>26</sup> Interactions between slow-changing institutions and fast-changing institutions discussed in a recent paper by Roland (2005) can be analyzed in terms of over-lapping linked games. .

a natural dynamic version formulated in the Momentum Theorem by Milgrom, Qian and Roberts (1991). Liberally rephrased, one version of it holds that, even if the initial level of human competence in domain X conducive to the support of potential institution  $x'$  is low, the presence of complementary institutions in other domains may amplify the impact of a policy intended to induce  $x'$ , and that once momentum is initiated,  $x'$  may gradually evolve as a viable institution. Conversely, even if laws are introduced to induce institution  $x'$ , the absence of complementary institutions and supporting competence in this and other domains can make its realization difficult (Aoki, 2001: 267-9).

One example is the role played by the institutional infrastructure of contract implementation in Hong Kong in the transition of the Chinese economy to a market economy. It is now well-recognized that China's remarkable growth since reform and open policy, which was initiated in the late 70s, was largely driven by foreign direct investments and commodity exports. By 1977, however, the Chinese economy was virtually closed to the world market economy, while the domestic economy was almost completely governed by a command system. How could such an economy attract massive foreign investments in spite of the infancy of its institutional infrastructure for market-exchange? How could it be expected to entertain export contracts in the absence of an effective rule of law governing domestic market exchanges? Actually large portions of capital inflow and commodity exports were mediated through Hong Kong, where the legal infrastructure of contract implementation and enforcement was relatively well developed and the associated competence of individuals in law, accounting, consulting, transportation logistics, and foreign languages was already in place or was relatively easy to recruit from abroad. Once the Chinese economy became involved in exchange relationships with outside markets, it was able to gradually develop its own market competence through complementary reinforcement by the infrastructure in Hong Kong.

Another possible version of the Momentum Theorem is the following: Suppose that changes in the parameters of the game-form (e.g., the introduction of new public policy, a change in legal rules, the accumulation of competence and so on) conducive to a possible alternative institution, or diametrical to existing institutions, occurs in a domain, but its initial impact in isolation is still too small. Then suppose that similar parametric changes also occur in a complementary domain (i.e., one in which the endogenous strategic profile is complementary to that in the other). Then, even though an institutional change may not immediately occur in either domain, if parametric changes are sustained thereafter in both domains, their cumulative impact on endogenous strategic choices in

respective domains, together with the reinforcing mutual impact of evolving strategic choices across the domains, can eventually lead to the co-evolution of new institutions across domains. This mechanism is particularly interesting for examining how a change in the political game-form (formal rules in the polity) and/or its consequence (policy change) can impact institutional changes in other domains. The causation may not be unidirectional from the polity to the other domains, but can be bi-directional in that changes in policy, and more fundamentally a political institutional change, can also be induced, and co-evolve with changes elsewhere.

For example, until some twenty years ago, stylized institutional arrangements across the corporate governance and political-exchange domains in Japan were modeled as contingent governance and bureau-pluralism, respectively (Aoki, 2001: Chapter 13). In the former, control rights of the corporate firm were held by the internal hierarchical organization of the permanent employees (the insiders) as long as the corporation's value-state remained problem-free, while they were expected to be transferred to the relational main bank if its value-state grew critically depressed. In other words, control rights were expected to shift between the insiders and the main bank, contingent on its value state. The main bank's interest in performing this function, which is sometimes costly in the event of corporate failure, was secured by the entry-restricting regulation of the government bureaucracy to assure bank rents from the relational system. This arrangement was embedded in the broader institutional framework of bureau-pluralism. This political institution was characterized by triadic coalitions between a particular interest group, the relevant bureaucracy and the associated politicians, formed in parallel along various industrial and occupational lines (the banking industry being one of them), with interest mediation among the coalitions performed through the bureaucratic processes of budgeting and protective regulation. Thus, the contingent governance and associated main bank system were supported by this mechanism of political governance, while bureaucrats and politicians expected to derive rents from their associations with banking and other industries in the form of post-retirement job opportunities and votes.

However, various quasi-parametric changes began to occur in the game-forms of both domains in the last decade or so. Particularly, corporate firms became less dependent on bank financing due to increased accessibility to global financial markets made possible by the world-wide decline of the relational system (Rajan and Zingales, 2002). A rule-change in the parliamentary electoral system made it increasingly difficult for politicians representing particular interest groups to be

elected.<sup>27</sup> These and other changes have triggered cumulative impacts on the institutions of the main bank system and bureau-pluralism. Well-run corporate firms have been drifting away from the protective orbit of bureau-pluralism, while the political power of the bureaucracy and the politicians representing the incumbents have been declining. The spiral impacts of quasi-parametric changes and associated changes in strategic choice variables have not yet completed their cycles, leaving the nature of evolving institutions still uncertain. However, the main bank system and bureau-pluralism to be definitely in eclipse as viable institutions by now (Aoki, Jackson and Miyajima, forthcoming).

## ***6. Concluding Remarks***

One of major objectives of this paper was to propose a unified, analytical and conceptual framework for understanding the roles of social, political, economic and organizational factors, as well as the nature of their interdependencies, in the process of institutional change. Different social science disciplines have tended to focus on only one, or a few, of those factors as endogenous in the process of institutional change, while viewing the others as exogenous data. In order to develop a more integrative approach, we borrowed the essence of the game-theoretic apparatus and modified it somewhat liberally.

In the beginning, we made a sharp distinction between the game-form (the exogenous rules of the game) and the equilibrium outcome of repeated strategic plays within it and identified institutions with the shared behavioral beliefs of the agents summarizing the salient features of the latter. Later, we tried to refine the notion of agents' bounded rationality further by introducing the concept of institution-induced, individual game-models: beliefs that individual agents form via their knowledge of institutions. An institutional change was seen to be triggered by a situation in which these individual game-models were no longer to be taken for granted because of quasi-endogenous changes in the objective game-form. The notion of an institution as a summary equilibrium representation and that of institution-induced, individual game-models were helpful for understanding the roles of public discourse; entrepreneurial, political, or

---

<sup>27</sup> Japan shifted from the single-seat district system to the multiple-seat system in the mid 1990s. In the old system, multiple politicians, each representing a different interest group, were elected from each district. But under the new system, these politicians tend not to be favored by the majority of voters, which has led to gradual changes in the composition of parliament members and more power for the Prime Minister beyond the role of a mere mediator among pluralistic triadic coalitions.

charismatic leadership; and legacies of social norms in the process of institutional change in which bounded rational agents participate.

One of the reasons why we introduced the equilibrium notion of institutions was to evade an often employed practice in the literature of making a distinction between operational games (with the institution given) and rule-making, social-choice games (or meta-games). One serious problem associated with this approach is infinite regression, that is, how the rules for the latter games are determined. Instead, we conceptualized institutions as ‘salient features’ of repeatedly played games without making a distinction between operational and rule-making institutions.

In order to understand how social, political, economic, and organizational factors interact in the formation, sustainability, and evolutionary changes of over-all institutional arrangements, we explicitly considered interdependencies of equilibrium formation across the domains involving each of those factors as principal characteristics. More specifically, we specified Schumpeterian bundling innovation, overlapping social embeddedness, and dynamic institutional complementarities as mechanisms of endogenous, interactive institutional changes. While the Schumpeterian bundling innovation can bring new design elements into the process by destroying old modes of bundling, the overlapping social embeddedness can impact it with elements of past legacies. Dynamic complementarities capture, among other things, the role of policy in the process of institutional change, which may operate only gradually and interactively with changes occurring elsewhere, sometimes with an unintended institutional outcome. Those mechanisms are conceptually distinct, but are likely to operate simultaneously and in an interactive manner in the process of institutional change. Innovation-oriented, Schumpeterian re-bundling has to take place in the milieu of complementary institutions/competence inherited from the past but embedded in persistent social norms. But, overlapping social embeddedness and institutional complementarities may not necessarily deter institutional innovation. On the contrary, the former can facilitate the emergence of a new domain by embedding it with the reproduction of time-honored patterns of social-exchanges. The latter can create a momentum for the emergence of new over-all institutional arrangements once worn-out links between the parameters of the game form and the endogenous strategic choices break simultaneously across complementary domains. On the other hand, Schumpeterian bundling innovation can make a new bundling of business activities independent with the generation of endogenous rents, sometimes leading to the erosion of old social norms.

Putting the three mechanisms in a unified perspective also suggests that the process of



institutional change may not necessarily be hierarchically ordered in terms of causation such that social norms are the most robust, while institutional change in the economic domain is primarily initiated in the polity. Certainly, there are many instances in which policy and legislative actions (as consequences) in the political exchange domain appear to trigger institutional changes in other domains. But even in this case, the process can be characterized as an instance of dynamic institutional complementarities in which policy change (a consequence of the play of the game in the polity domain) is initiated in response to the emergence of concomitant endogenous changes in other domains, while policies reinforce complementary interactions across those domains. As a consequence, it is not rare for policies to ultimately yield unintended institutional outcomes in the end.

Thus, institutions in the past and in the future are mutually interlinked in a complex manner. Institutions generated endogenously at one point of time become exogenous constraints and/or enabling facilitators for further institutional dynamics in their own domains as well as beyond. There are spiral movements for the newly born to eventually become the established, on which basis further institutional evolution can be molded *ad infinitum*. No theory can escape from the problem of infinite regression. However, we have sought to focus on infinite regression directed toward the historical past rather than the logical construct of the meta-game or the preeminence of the political-exchange domain in institutional formation. In that sense, ‘history matters’ as well as ‘institutions matter’.

## REFERENCES

Alchian, A., and H. Demsetz (1972), 'Production, Information Costs, and Economic Organization', *American Economic Review*, **62**: 777-95,

Amable, B. (2003), *The Diversity of Modern Capitalism*, Oxford: Oxford University Press.

Aoki, M. (2001), *Toward a Comparative Institutional Analysis*, Cambridge, Mass.: MIT Press.

Aoki, M., and Y. Hayami (eds.) (2001), *Communities and Markets in Economic Development*, Oxford: Oxford University Press.

Aoki, M., G. Jackson and H. Miyajima (forthcoming), *Corporate Governance in Japan: Institutional Change and Organizational Diversity*, Oxford: Oxford University Press.

Aoki, M. and H. Takizawa (2002), 'Information, Incentives, and Option Value: The Silicon-Valley Model', *Journal of Comparative Economics*, **30**: 759-86.

Arrow, K.J. and L. Hurwicz, 'Decentralization and Computation in Resource Allocation', in R.W. Pfouts (eds.), *Essays in Economics and Econometrics*, Chapel Hill: University of North Carolina Press: 34-104.

Aumann, R. J. (1974), "Subjectivity and Correlation in Randomized Strategies," *Journal of Mathematical Economics*, :67-96.

Aumann, R. J. (1976), 'Agreeing to Disagree,' *Annals of Statistics* 4: 1236-39.

Baldwin, C. Y. and K. B. Clark (2000), *Design Rules: The Power of Modularity*, Vol. 1, Cambridge, Mass: MIT Press.

Barca, F., K. Iwai, U.Pagano, and S.Trento (1999), 'The Divergence of Italian and Japanese Corporate Governance Models: The Role of Institutional Shocks,' *Economic Systems*, **3**: 35-61.

Bardhan,P. (1977), ‘Variations in Forms of Tenancy in a Peasant Economy’, *Journal of Development Economics*, **4**: 105-18.

Berger, P. and T. Luckmann (1966), *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*. N.Y.: Doubleday Anchor.

Blau, P. (1964/1998), *Exchange and Power in Social Life* with new introduction, Brunswick, N.J.: Transaction Publishers.

Braudel, F. (1958/1997), ‘History and the Social Sciences: The *Longue Duree*’, in S. Mathews (tr.), *On History*, Chicago: University of Chicago Press: 24-55.

Calvert, R. L. (1995), ‘Rational Agents, Equilibrium, and Social Institutions’ in J. Knight and I.Sened (eds.), *Explaining Social Institutions*, Ann Arbor: University of Michigan Press; 57-93.

Coleman, J. (1990), *Foundations of Social Theory*, Cambridge Mass.: Harvard University Press.

Dixit, (2004), *Lawlessness and Economics*, Princeton, N.J.: Princeton University Press.

Dosi, G. and L. Marengo (1994), ‘Some Elements of an Evolutionary Theory of Organizational Competence’ in England (1994), ed., *Evolutionary Concepts in Contemporary Economics*: Ann Arbor: University of Michigan Press:157-78.

Fagin,R., J.Y.Halpern, Y.Moses and M.Y.Vardi (1996), *Reasoning about Knowledge*, Cambridge, Mass.:MIT Press.

Field, A. J. (1981), ‘The Problem with Neoclassical Institutional Economics: A Critique with Special Reference to the North-Thomas Model of pre-1500 Europe’, *Exploration in Economic History* 18: 174-198.

Field, A.J. (2001), *Altruistically Inclined? Evolutionary Theory, the Behavioral Sciences, and the*

*Origin of Complex Social Organization*, Ann Arbor: University of Michigan Press.

Gibbard, A.(1973), ‘Manipulation of Voting Schemes: A General Result’, *Econometrica* **41**: 587-601.

Granovetter, M. (1985), ‘Economic Action and Social Structure: The Problem of Embeddedness’, *American Journal of Sociology*, **91**: 480-510.

Greif, A. (1993), ‘Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders’ Coalition’, *American Economic Review* 83: 525-548.

Greif, A. (1997), ‘Micro Theory and Recent Developments in the Study of Economic Institutions through Economic History’, in D. Kreps and K. Wallis (eds.), *Advances in Economics and Econometrics: Theory and Applications*, Vol. 2, N.Y.: Cambridge University Press: 79-113.

Greif, A. (2005), ‘Commitment, Coercion and Markets: The Nature and Dynamics of Institutions Supporting Exchange’, in C. Menard and M. M. Shirley (eds.), *Handbook of New Institutional Economics*, Dordrecht: Springer: 727-86

Greif, A. (2006), *Institutions and the Path to the Modern Economy: Lessons from Medieval Trade*, N.Y. : Cambridge University Press.

Hayek, F. A. (1945), ‘The Use of Knowledge in Society’, *American Economic Review*, **35**: 519-530.

Hayek, F. A. (1976), *Law, Legislation and Liberty*, Vol . II: *The Mirage of Social Justice*, London: Routledge & Kegan Paul.

Hayek, F. A. (1988), *The Fatal Conceit: The Errors of Socialism*, Chicago: University of Chicago Press.

Hicks, J. (1969), *A Theory of Economic History*, Oxford: Oxford University Press.

Holland, J., K. Holyoak, R. Nisbett, and P. Thagard (1989), *Induction: Processes of Inferences, Learning and Discovery*, Cambridge, MA: MIT Press.

Hurwicz, L. (1960), 'On the Dimensional Requirements for Non-wasteful Resource Allocation Systems', in K.J. Arrow, S.Karlin, and P.Suppees (eds.), *The Mathematical Methods in the Social Sciences 1959*, Stanford: Stanford University Press.

Hurwicz, L. (1996), 'Institutions as Families of Game-forms', *Japanese Economic Review*, **47**: 13-132.

Huizinga, J. (1949), *Homo Ludens. A Study of Play Element in Culture*, London: Routledge & Kegan Paul.

Ikegami, E (2005), *Bonds of Civility: Aesthetic Networks and the Political Origins of Japanese Culture*, N.Y.: Cambridge University Press.

Kalai, E., and E. Lehrer (1995), 'Subjective Games and Equilibria', *Games and Economic Behavior*, **61**: 1019-45.

Koopmans, T. (1957), *Three Essays on the State of Economic Sciences*. N.Y.: McGraw Hill.

Krepke, S. (1963), "A Semantical Analysis of Modal Logic," *Acta Philosophica Fennica* 24: 83-94.

Levi, M. ((1988) *Of Rule and Revenue*, Berkeley: University of California Press

Lewis, D. (1969), *Conventions, A Philosophical Study*, Cambridge, Mass.: Harvard university Press.

Meyer, J. W., and B. Rowan (1977), 'Institutionalized Organizations: Forma Structure as Myth and Ceremony,' *American Journal of Sociology* 83: 340-63. Reprinted in W.W. Powel and P. DiMaggio (1991:41-62).

Milgrom, P., D. North and B. Weingast (1990), 'The Role of Institutions in the Revival of Trade:

The Law Merchant, Private Judges, and the Champagne Fairs', *Economics and Politics*, **2**: 1-23.

Milgrom, P., Y. Qian and J. Roberts (1991), 'Complementarities, Momentum, and the Evolution of Modern Manufacturing', *American Economic Review*, **81** (Papers and Proceedings): 84-88.

Milgrom, P. and J. Roberts (1990), 'Rationalizability, Learning, and Equilibrium in Games with Strategic Complementarities', *Econometrica*, **59**: 1255-77.

Murdock, K. (1966), *The Role of Institutions in Enforcing Implicit Contracts: Analysis of Corporate and Government Policy*, PhD Dissertation, Stanford University. .

Nelson, R. and B.N.Sampat (2001), 'Making Sense of Institutions as a Factor Shaping Economic Performance', *Journal of Economic behavior and Organization*.

Nelson, R. and S. Winter (1982), *An Evolutionary Theory of Economic Change*, Cambridge, MA: Harvard University Press.

North, D. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge, U.K. and N.Y.: Cambridge University Press.

North, D. (2005), *Understanding the Process of Economic Change*, Princeton, N.J.: Princeton University Press.

Osborne, M. J. and A. Rubinstein (1994), *A Course in Game Theory*. Cambridge, MA: The MIT Press.

Polanyi, K. (1944), *The Great Transformation*, N.Y.: Farrar Rinehart.

Powell, P.P., and P. DiMaggio (eds.) (1991), *The New Institutionalism in Organizational Analysis*, Chicago: University of Chicago Press.

- Prescott, E.C., and K. Shell (2002), 'Introduction to Sunspots and Lotteries', *Journal of Economic Theory*, 107: 1–10.
- Rajan, R., and L. Zingales, (2003), *Saving Capitalism From the Capitalists: Unleashing the Power of Financial Markets to Create Wealth and Spread Opportunity*, New York: Crown Business.
- Roland, G. (2005), 'Understanding Institutional Change: Fast-moving and Slow-moving Institutions', <http://emlab.berkeley.edu/users/groland/pubs/gr3.pdf>.
- Schelling, T., (1960), *Strategy of Conflicts*, Cambridge Mass.: Harvard University Press.
- Schotter, A. (1981), *The Economic Theory of Social Institutions*. Cambridge, U.K. and N.Y.: Cambridge University Press.
- Schumpeter, J. (1912/1934), *The Theory of Economic Development*. Cambridge, MA: Harvard University Press. English translation of *Theorie der Wirtschaftlichen Entwicklung* by R.Opie, 1912.
- .
- Scott, W. R. (1955), *Institutions and Organizations*, Thousand Oaks: Sage Publications.
- Searle, J. R. (1995), *The Construction of Social Reality*, London: Allen Lane.
- Searle, J. R. (2005), "What is an Institution?" *Journal of Institutional Economics* 1:1-22.
- Smith, A. (1759/1976), *The Theory of Moral Sentiments*, Oxford: Oxford University Press.
- Sugden, R. (1986), *The Economics of Rights, Cooperation and Welfare*, Oxford: Basil Blackwell.
- Topkis, D. (1978), 'Minimizing a Submodular Function on a Lattice', *Operations Research*, **26**: 305-321.
- Weingast, B. (1997), "The Political Foundations of Democracy and the Rule of Law", *American Political Science review*, **91**:245-63

Williamson, O. E. (2000), 'The New Institutional Economics: Taking Stock, Looking Ahead', *Journal of Economic Literature*, **38**: 595-613.

,

World Bank (2002), *World Development Report 2002: Building Institutions for Markets*, N.Y.: Oxford University Press.

Young, H.P. (1998), *Individual Strategy and Social Structure: An Evolutionary Theory of Institutions*, Princeton, NJ: Princeton University Press.



*Figure 1.*

