# Innovation and Organization:

## Why should the Analytical Framework be *Dual-structured, Evolutionary One?*

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**Abstract**

This paper aims to construct the theoretical foundation of an alternative analytical framework of the theory of the firm which can incorporate innovating organization. Although many scholars who criticised the static, unrealistic nature of the conventional theory of the firm favor kinds of the evolutionary framework, it has not been clear what kind of theoretical framework should be adopted. By examining an important debate on the use of evolutionary concept in economics, the foundation of the "theory of innovative enterprise" will be explored.

## 1 Introduction

Innovation is a very significant key to our understanding of capitalist economic development. From this perspective, a firm or a group of firms should be treated as innovating organization, which is the position Marx, Marshall and Schumpeter all shared, as Lazonick (1991) thoroughly argued.

In spite of this perception, innovation has been one of the most difficult topics to be incorporated into the framework of neoclassical economics. Conventional theory of the firm, as well as the new institutionalist variant like transaction cost economics, has argued that the optimizing firm is the existing firm and *vice versa*. Many authors have criticized the static, unrealistic nature of this argument. According to Lazonick (1991, pp. 191–227), this argument assumes only the *adaptive* firm and lacks "the theory of innovative enterprise". In fact, it is not clear whether an optimizing firm is also an innovative firm.

This paper aims to construct the theoretical foundation of an alternative analytical framework of the theory of the firm which can incorporate innovating organization. As was argued in Tokumaru (2003), an alternative framework of the theory of the firm has been constructed so as to incorporate innovation. However, it lacks the theoretical foundation which justifies the adoption of this alternative framework rather than of the conventional theory of the firm. Moreover, implications of this framework should be explored in real contexts by detecting causal mechanisms underlying these contexts. Through this procedure novel theoretical concepts can be gained which are expected to serve to analyze other similar phenomena.

In this paper, the foundation of the "theory of innovative enterprise" (Lazonick, 1991) is explored. In section 2, we argue that the *evolutionary* framework is an appropriate framework for the theory of

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the innovative firm. It can explain at the same time both the change of a system, such as a firm or a group of firms, and the variety of entities in a group without relying on excessive rationality of individuals. While economists today often take evolutionary way of thinking as unconventional despite the successful introduction of the evolutionary game theory (e.g., Aoki, 2000), even proponents of neoclassical economics such as Armen Alchian or Milton Friedman tried to incorporate evolutionary framework into neoclassical economics, as will be shown. Therefore, it is natural for economics to adopt such a framework. Moreover, it will be argued that the evolutionary framework can quite well explain patterns of firm behavior repeatedly observed. Thus, evolutionary framework is appropriate for the theory of the innovative firm. In section 3, by examining the early effort to introduce the evolutionary argument into orthodox economics since the 1950s[1)] and the divergent consequences of this effort, it is argued that the evolutionary theory of the firm should adopt the *dual-structured* framework. Based on this argument, we show that, while this dual-structured framework seems to be synonymous with the "genotype-phenotype" distinction in biology, it is employed in economics not because it is just an useful biological analogy, but it is an indispensable framework when we analyze the selection process in the economy. In this sense, evolutionary framework is not a mere biological analogy: On the contrary, it stands on its own in economics. This "evolutionary, dual-structured" framework proposed in these sections is compared with the approach of a dominant theory of the firm, namely, new institutional economics in section 4. In the last section, we conclude this paper with implications for further research.

## 2 Why should the theory of the innovative firm be *evolutionary*?

If we agree with the argument made by Lazonick (1992) that the realistic theory of the firm should be "the theory of innovative enterprise", we are forced to answer a novel question of what the sound theoretical framework is.

It is natural to assume that an innovative firm confronts the uncertain environment because, first of all, an innovation may change the environment in unintended ways. In such an environment, an innovative firm cannot rely on the rational calculation when, for example, it tries to introduce a new product or a new manufacturing technology. As a consequence, various patterns of firm behavior should arise.

It is into this situation that Alchian (1950) tried to introduce the evolutionary framework, namely, the idea "economic natural selection". Under uncertainty, "profit maximization is meaningless as a guide to specifiable action." (Alchian, 1950, p. 211) If so, neoclassical theory of the firm which is

1 ) Of course, this effort in the 1950s was not the first one which tried to introduce evolutionary framework into economics. According to Hodgson (1993), Veblen was the first economist who explicitly introduced the evolutionary framework of Darwinism into economics. However, as will be argued in the next section, works of modern evolutionary economics following Nelson and Winter (1982) are, directly or indirectly, under the influence of this debate in the 1950s initiated by a neoclassical economist, Armen Alchian. Thus, note the surprising fact that it was a neoclassical economist who revived the evolutionary thinking in economics. On a detailed survey of modern evolutionary economics, see Nelson (1995) and Nelson and Winter (2002).

based on the profit-maximization assumption seems fruitless. He argued, however, that if the neoclassical theory of the firm is incorporated into the evolutionary framework, it still remains valid. His main argument is as follows: Suppose firms behave randomly. It is also assumed that firms with higher profitability grow up more rapidly because they can reinvest more. As time goes by, the share of less profitable firms will contract, and in the end they may go into bankruptcy. In this way, from firms with various behaviors, market selects firms with high profitability. Then, economists can conclude that surviving firms tend to be firms which happen to behave as if they maximize their profit. In this reasoning, even though no assumption of rational behavior is adopted, the prediction by neoclassical theory of the firm is valid. This conclusion is reinforced when assumptions of adaptive behavior such as imitation or trial-and -error are introduced.

What is the virtue of the evolutionary framework? We define "evolutionary framework" as follows: it explains the change of a system in terms of mutation, inheritance, and selection mechanisms inherent in that system[2)]. Apart from the validity of Alchian's argument above, which will be examined in detail in the next section, his insight that evolutionary framework is quite appropriate in order to analyze the behavior under uncertainty deserves careful attention. As his argument shows, the virtue of evolutionary framework is, first of all, that it can explain the behavior of a system without assumptions of excessive adaptive capability; its explanation is based on the change in the population composed of various entities, which is caused by the process of selection[3)]. Thus, it can explain at the same time both the change of a system, such as a firm or a group of firms, and the variety of entities in a group without relying on the excessive rationality.

Now it is clear that the evolutionary framework can explain, among others, the following two patterns of firm behavior repeatedly observed, namely, (1) the coexistence of firms with different performances even in the same environment (cf. Nelson, 1991), and, (2) the unintended consequence of action (cf. Fujimoto, 1999). Concerning the latter case, Fujimoto (1999) successfully explained the development of "Toyota production system" by adopting the evolutionary framework, which includes a lot of unintended events.

Based on the argument above, we can conclude that, following Alchian, in order to analyze the behavior of firms under uncertainty, it is appropriate for the theory of the firm to adopt the evolutionary framework.

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2 ) Note that the "system" here is not limited to the *biological* system. As Metcalfe (1998, pp. 36–38) argued, because the evolutionary theory is a general reasoning of change of a system, the domain of application should not be limited to biological systems. See also Hodgson (2002a), in which he argued that Darwinism adopted in economics should not be taken merely as a "biological analogy".

3 ) This way of thinking is now often called "population thinking" which was originally named by a biologist Ernst Mayr (e.g., Mayr, 1988) in order to characterize the evolutionary analysis compared with other modes of analysis. According to Andersen (1994), "population thinking" confronts "typological thinking"; the latter considers "the differences between basic types and their concrete instances as something which should be ignored in order to focus on the true essence of the phenomena" (Andersen, 1994, p. 10), while the former considers the difference among entities as essential in order to understand the behavior of the system.

## 3 Why should the evolutionary theory of the firm be *dual-structured*?

What is the appropriate analytical framework for the evolutionary theory of the firm? In this section, we propose that the evolutionary theory of the firm should adopt its specific analytical framework, namely, a *dual-structured* framework, which is distinct from the one adopted by the neoclassical theory of the firm.

As we argued in the preceding section, the evolutionary thinking in economics was revived by Alchian's seminal article (Alchian, 1950). However, as will be shown in this section, while his 1950 article contained significant implications for further development of the evolutionary thinking in economics, he does not explicitly present an appropriate analytical framework for evolutionary theory of the firm. It was Sidney Winter who explicitly proposed an analytical framework distinct from the one adopted by neoclassical theory of the firm (Winter, 1964), in which he critically examined preceding articles on the relevance of evolutionary thinking in economics, including Alchian (1950), Penrose (1952), and Friedman (1953). By examining arguments made by these articles, as we will discuss later, it is possible to understand the reason why the evolutionary theory of the firm should adopt the *dual-structured* framework. In addition, based on this reasoning, we will propose that this *dual-structured* framework is not a mere biological analogy: On the contrary, it will be shown that it stands on its own in economics.

### 3.1 Optimization as evolution, evolution as optimization: Alchian and Friedman on evolutionary interpretation of the neoclassical theory

As I argued in the preceding section, it was Alchian who revived the evolutionary thinking in economics. His seminal article (Alchian, 1950) had profound influence on economists who, on the one hand, tried to justify the neoclassical theory of the firm which is based on the assumption of profit maximization, and, on the other hand, who questioned that dubious assumption and tried to construct the alternative framework of the theory of the firm. Such a broad audience implies the fertility of his argument. Thus, I examine his argument in some detail here.

Alchian (1950)'s most important contribution was to introduce the "population thinking" into economics, as argued above. According to this article, "by backing away from the trees—the optimization calculus by individual units—we can better discern the forest of impersonal market forces. This approach directs attention to the interrelationships of the environment and the prevailing types of economic behavior which appear through a process of economic natural selection." (Alchian, 1950, p. 213) Because of the fact that "in an economic system, the realization of profits is the criterion according to which successful and surviving firms are selected" (Alchian, 1950, p. 213) , economists do not have to know the behavior of individual firms at all. "This decision criterion is applied primarily by an impersonal market system", and "may be completely independent of the decision processes of individual units, of the variety of inconsistent motives and abilities, and even of the individual's awareness of the criterion." (Alchian, 1950, p. 213)

This approach implies that the *realized* profits of a firm is the only criterion for its survival, regardless of its motivation. "Realized positive profits, not *maximum* profits, are the mark of success

and viability. It does not matter through what process of reasoning or motivation such success was achieved. The fact that its accomplishment is sufficient. This is the criterion by which the economic system selects survivors: those who realize *positive profits* are the survivors; those who suffer losses disappear." (Alchian, 1950, p. 213)

By reinterpreting the neoclassical theory of the firm by applying this framework, can economists predict the behavior of a system? The answer by Alchian was "yes", because even when individual units do not behave rationally at all, economists are assumed to know conditions for survival, as well as the given environment, as argued in section 2. "With a knowledge of the economy's realized requisites for survival and by a comparison of alternative conditions, he can state what types or behavior relative to other possible types will be more viable, even though the firms themselves may not know the conditions or even try to achieve them by readjusting to the change situation if they know the conditions." (Alchian, 1950, p. 216) Thus, he could argue that economists do not have to reject the conventional analytical tools, because they can predict the dominant type of behavior under the changed environment by using the conventional tools[4]. Only the interpretation should be changed; conventional theory is not on the behavior of individual units, as has been thought of, but on the type of behavior which is selected according to the profitability criterion.

While his introduction of "population thinking" and associated arguments deserved careful attention which could be a source of the new theoretical framework[5], his argument was understood simply as a justification of the neoclassical theory of the firm by his successors. Enke (1951) agreed with Alchian in arguing that "it is unreasonable to suppose that each firm acts to maximize profits." Thus, "the economist cannot make individual-firm predictions in the short run." (Enke, 1951, p. 567) However, he went further than Alchian to argue that "in the long run, however, if firms are in active competition with one another rather than constituting a number of isolated monopolies, natural selection will tend to permit the survival of *only* those firms that either through good luck or great skill have managed, almost or completely, to optimize their position and earn the normal profits necessary for survival. In these instances the economist can make aggregate predictions *as if* each and every firm knew how to secure maximum long-run profits." (Enke, 1951, p. 567; original emphasis) In sum, a surviving firm became equated with a profit-maximizing firm, and *vice versa*, in the long run.

This position was furthered in a famous paper by Friedman (1953), in which he argued that the operation of natural selection ensures the statement that firms in fact behave *as if* they were maximizing profits, because the market selects only the profit-maximizing firms. From this argument,

4 ) He gave a following example; "suppose that, in attempting to predict the effects of higher real wage rates, it is discovered that every businessman says he does not adjust his labor force. Nevertheless, firms with a lower labor-capital ratio will have relatively lower cost positions and, to that extent, a higher probability of survival. The force of competitive survival, by eliminating higher-cost firms, reveals a population of remaining firms with a new average labor-capital ratio." (Alchian, 1950, p. 217) Then he argued that "all that is needed by economists is their own awareness of the survival conditions and criteria of the economic system and a group of participants who submit various combinations and organizations for the system's selection and adoption." (Alchian, 1950, p. 217)

5 ) As will be argued below, Winter (1964) followed Alchian's lead and constructed an natural selection model, in which he criticized the ambiguity of Alchian (1950).

he derived a famous methodological proposition; even a theory without realistic behavioral assumptions is valid as long as it can make correct predictions.

### 3.2 Dubious assumptions on the behavioral motivation and the nature of environment: Penrose's critique of natural selection argument

Edith Penrose (1952) made a forceful criticism of "biological analogy" in economics, in which the natural selection argument initiated by Alchian was also criticized. Although she was critical of introducing concepts from biology, her argument contained significant insights into the nature of economic evolution.

First of all, Penrose criticized the assumption of random behavior in Alchian (1950), because it is inconsistent with his natural selection argument. According to Penrose, without motivation, "economic competition, leading to the elimination of all but the best adapted within a community, cannot be assumed." Thus, the motivation of behaviors should be explicitly introduced. (Penrose, 1952, p. 816) This argument implies that natural selection argument requires some kinds of "genetic mechanism" which ensures the behavioral continuity of firms. As selection takes time, without such mechanisms, maladapted firms cannot be eliminated.

In addition, she argued that firms cannot be assumed to behave randomly even under uncertainty. According to her observation, "one of the more powerful effects of uncertainty is to stimulate firms to take steps to reduce it by operating directly on the environmental conditions that cause it" (Penrose, 1952, p. 816). Thus, the motivation of behavior should be introduced which is consistent with observed evidences.

This fact that firms try to change their environment implies that it is questionable to assume that the environment of competing firms is independent of firms' behavior, as Alchian (1950) assumed. If the environment and firms' behavior are interdependent, as assumed by Penrose, then "a prediction of the kinds of firms that will survive in the long run must take account of all the reactions that a given change in the environment will induce." (Penrose, 1952, p. 815) However, she argued, this is impossible since economists know very little "about all of the secondary and tertiary reactions that will in the end determine the 'conditions of survival' " (Penrose, 1952, p. 815). Therefore, even when an economist knows "the survival conditions and criteria of the economic system" (Alchian, 1950, p. 217), it is impossible to predict who will survive in the end.

### 3.3 Distinction between "rule of action" and "action actually taken": Winter's critique of the natural selection argument

As criticized by Penrose, the natural selection argument of Alchian (1950) contains serious shortcomings. Such shortcomings arise partly because arguments by Alchian, Enke, and Friedman all lack analytical models in which the mechanism of natural selection is explicitly specified. It was Sidney Winter (1964) who criticized this ambiguous nature of the natural selection argument. While he appreciated the fruitfulness of Alchian's "population thinking", he built an natural selection model and examined conditions under which natural selection implies the "survival of the optimal", as Friedman (1953) argued. As will be made clear, Penrose's criticism referred to above heavily

influenced Winter's model.

Winter (1964) followed Alchian (1950)'s claim that "realized positive profits, not *maximum* profits, are the mark of success and viability." (Alchian, 1950, p. 213) In other words, Alchian distinguished *results* from *motivations* and argued that natural selection operates not on motivations but on results of a firm's behavior. According to his argument, regardless of what assumption of motivation is adopted, including the assumption of random behavior, the natural selection argument ensures the prediction made by the neoclassical theory of the firm. Thus, his argument does not require any specific assumption of motivation.

On the contrary to Alchian (1950), following the criticism made by Penrose (1952), Winter (1964) argued that the natural selection argument requires specific behavioral assumptions which are also the basic sources of continuity of firms' characteristics. As clearly stated by Winter, if "there were no causal link between the characteristics of the $n^{th}$ generation and the characteristics of the $n + 1^{st}$, there could be no natural selection and no evolution" (Winter, 1975, p. 96), simply because there are no firms which behave consistently to be selected. In sum, the natural selection argument needs behavioral assumptions which incorporate the "genetic mechanism".

This is the reason why Winter (1964) introduced two distinct concepts, namely, "action" and "rule of action"[6]. The rule of action *partly*[7] determines actions actually taken, and includes, for example, pricing rules, investment decision rules, and R&D decision rules. These rules ensure the behavioral continuity[8] which is essential for the natural selection argument (Winter, 1975, p. 101).

Based on this framework, Winter (1964) built a natural selection model and showed that Friedman (1953)'s "survival of the optimal" conclusion is valid only if very strict conditions are met. His argument is as follows: Assume that all competing firms have their own decision rules on output- and price-determination, including the profit-maximizing rule actually followed by some firms. Firms with positive profits grow by reinvestment, while firms with negative profits shrink. The scale of firms with zero profit remains unchanged. Then, we can assume the "selection equilibrium" in which all existing firms earn zero profit, and thus, the growth or shrink of these firms cannot be observed (Winter, 1964, pp. 252–253). In Figure 1, the selection equilibrium price is $w_1 = w_2 = w_3$, in which only firms with rules $\alpha_1$, $\alpha_2$ and $\alpha_3$ survive. It should be noted that in this selection equilibrium non-optimizing firms with rules $\alpha_2$ and $\alpha_3$ are not removed by natural selection, contrary to the Friedman's argument that only the optimizing firms, in this case firms with the rule $\alpha_1$, survive. Since "profit maximizing *rules of behavior*" and "profit maximizing *actions*" (Winter, 1987, p. 546) are clearly distinguished here, the profit maximizing *action* taken by surviving firms is not necessarily based on

6 ) As will be argued in the next section, in Nelson and Winter (1982) the term "routine" was used instead of "rule of action". Alternatively, sometimes the term "behavioral rule" has also been used (Winter, 1987).

7 ) Action are assumed to be also determined in part by the environment, because there may be rules which are used only under limited environmental conditions (Winter, 1975, p. 97).

8 ) This does not mean the behavior of a firm never changes. Instead, it is assumed that the behavioral change of a firm is rule-guided. For example, a firm follows the mark-up pricing rule according to which price is determined by adding 20% margin to the average cost. If the cost chances, pricing *action* of this firm also changes. However, this change is governed by a rule. See also Hodgson (2002b).

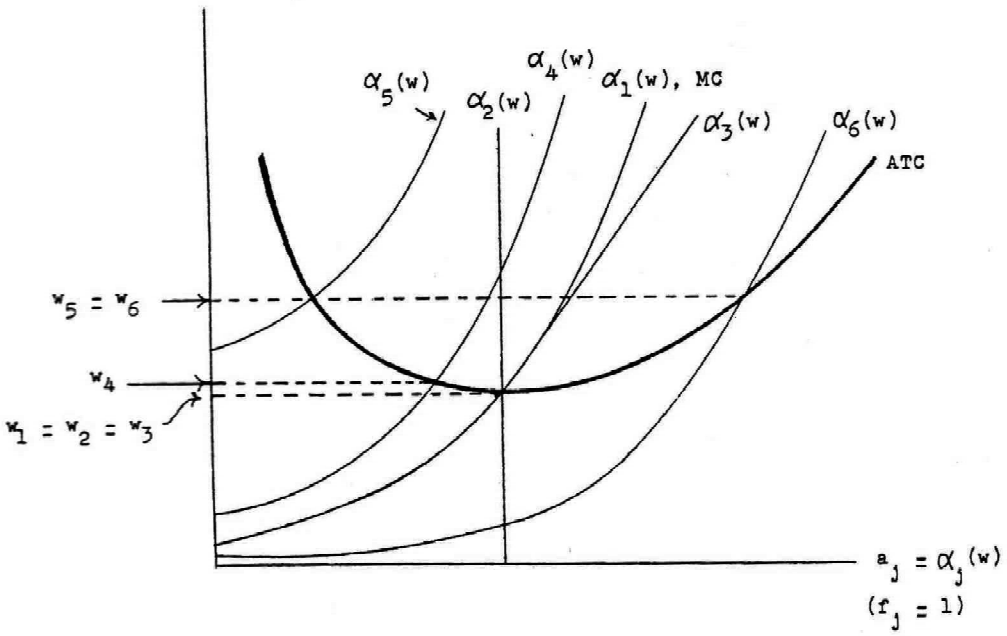


Figure 1: Selection equilibrium (Winter, 1964)

the profit maximizing *rule of behavior*. Thus, the natural selection mechanism operating on actions actually taken cannot distinguish profit maximizers from non-maximizers, all of which take the profit maximizing *action*. Non-optimizing firms with rules $\alpha_2$ and $\alpha_3$ may be removed if the environment changes radically and if the new, changed environment is sustained for long time enough to remove these non-optimizing firms. However, it is quite uncertain whether these conditions are met (Winter, 1964, pp. 257–258). Moreover, if the extent and speed of environmental change are too large, it might be quite hard to find out firms with profit maximizing action because of great uncertainty.

When we abandon the strong assumption that the selection equilibrium can be reached, the "survival of the optimal" conclusion becomes even more dubious. Firstly, it is easy to see that a non-optimizing type of firms which is less viable can be dominant if a lot of such firms enter into this industry. This implies that the natural selection argument should incorporate the analysis of entry and exit (Winter, 1964, p. 243; Winter, 1975, p. 97). Secondly, environmental changes caused by firms' actions may make the selection of profit-maximizers difficult. Suppose all firms follow non-optimizing rules of action. If some firms happen to take the profit maximizing *action*, then the scale of these firms expand. As a result, the environment, such as prices of inputs, will change. In this new environmental condition, it is not evident whether these firms are still more profitable than any other firms (Winter, 1964, p. 240). In addition, in an explicitly dynamic setting, Witt (1986) examined a simulation model and showed that the high profitability is not *necessary* nor *sufficient* condition for survival. In his simulation results, although profit-maximizing firms are most profitable, they are less viable than other adaptive, rule-following firms. This is mainly because profit-maximizing firms are susceptible to unexpected demand changes, as they have just nearly the *optimal* scale without enough

margin[9].

### 3.4 A dual-structured framework: Routine and action

Now it is clear that if we employ the evolutionary framework as presented in the previous section, we should adopt the *dual-structured* framework in which "rule of action" and "action" are clearly distinguished, because the existing actions are not necessarily based on the optimization rule even when the operation of strong natural selection is assumed.

We introduce a *dual-structured* framework which is consistent with the argument above. This framework is composed of two dimensions; explicit or implicit rules which *partly* govern actions of firms, and actions actually taken. They are simply termed "routine" and "action", respectively.

Routine of an organization is defined here as skills, conventions, rules, procedures, strategies, and technologies which are utilized during the course of operation of this organization[10] (cf. Levitt and March, 1988). While the conventional use of the term "routine", such as "routine behavior", connotes that the term refers to the dimension of *action*, however, it should be noted that the routine is not the visible behavioral pattern. For example, suppose an action A is recurrently observed. Although A is certainly a visible action, which may be conventionally termed "routine behavior", the rule leading to the action A is not visible; we cannot know whether the rule is "if B occurs, then do A" or "if C occurs, then do A". Thus, the routine as *rules* of action should be clearly distinguished from action actually observed.

While it can be easily observed that a large part of operations of a firm is executed by following routine procedures, we tend to think that the *strategic* decision making does not have anything with such routine procedures. However, as Nelson and Winter (1982) thoroughly argued, such strategic decisions as decisions on investment or R & D are in fact made largely by following heuristics, which can be seen as a part of the routine of a firm (Nelson and Winter, 1982, pp. 128–134)[11].

Based on this argument, Nelson and Winter (1982, pp. 16–18) distinguished three classes of

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9 ) See also Lee and Deguchi (2002). Using a simulation model, they showed that any of three types of firms, namely, profit-maximizing firms, share-maximizing firms, and technological progress-maximizing firms, do not dominate the industry at all. Lee and Deguchi, as well as Witt (1986), all implied that the explicit analysis of the process through which selection operates is essential if one wants to know the consequence of the natural selection. Krugman (1996) argued against this kind of process analysis that "maximization-and-equilibrium" is just an useful fiction by which we can organize our thinking. Thus, it is irrelevant for Krugman, as well as Friedman (1953), to ask whether this "maximization-and-equilibrium" assumptions are realistic or not. By examining the fact that even evolutionary theorists in biology also adopt the "maximization-and-equilibrium" framework, he argued that evolution can be approached by this framework familiar to economists. However interesting this fact is, we should appreciate the result by those authors that "process matters", at least as far as the *economic* evolution is concerned. If so, there still remains a question of whether *economic* and *biological* evolution can be analyzed in the same way. See also the introductory chapter of Maynard Smith (1982), where he justified the use of "maximization-and-equilibrium" method in biology.

10) This definition is largely in line with Nelson and Winter (1982)'s detailed argument on the organizational routine.

11) In this case, too, *rules* and *results* of action should be clearly distinguished; the fundamental uncertainty of the results does not mean the absence of behavioral rules. Likewise, it should be noted that "viewing innovative activity as "routine" in this sense does not entail treating its results as predictable." (Nelson and Winter, 1982, pp. 132–133)

routines of a firm. Firstly, there are routines related with daily operations, given a firm's capital stock. Secondly, there exist routines which govern the capital stock of a firm. Thirdly, a firm has routines which modify the preceding routines[12].

### 3.5 Dual-structured, evolutionary framework is *not* just a biological analogy

Now it is evident that the framework introduced above is *not* just a relevant biological analogy. First of all, as referred to in a footnote above, as evolutionary theory is a general reasoning of change of a system, the domain of application need not be limited to biological systems. In addition, as partly stated by Alchian (1950, p. 220), there are mechanisms of mutation, inheritance, and selection also in the economic sphere; innovation, routine, and differential profitability[13], respectively. Thus, although it is meaningless to look for one-to-one correspondences between mechanisms of economic and biological evolution, it is relevant enough for economics to adopt the evolutionary framework.

Secondly, moreover, although the economic distinction between *routine* and *action* seems merely an analogy of the biological distinction between *genotype* and *phenotype*, which is implied in Nelson and Winter's phrase "routines as genes" (Nelson and Winter, 1982, p. 134), the former, economic distinction stands on its own. As shown above, the adoption of natural selection argument itself requires this distinction as a logical consequence.

In sum, thus, it is possible to adopt the evolutionary framework even though there are no exact one-to-one correspondences between mechanisms of economic and biological evolution. Although a biological mechanism of evolution may be a clue to our investigation into economic evolution, the former cannot be used simply as an analogy.

## 4 A brief comparison with the framework of new institutional theory of the firm

In this section, the theoretical framework employed in the new institutional theory of the firm[14] is examined, comparing with the dual-structured, evolutionary framework introduced above. The new institutional theory of the firm is different from the neoclassical theory of the firm in that it has tried to answer the question why economic activities are organized by firms, not by the market, which was the question explicitly addressed by Coase (1937). The different branches of the new institutional economics share their interests in issues arising from information asymmetry[15]. It should be

12) Note that these "routine-modifying" routines do not necessarily generate intended performances. Because the modification of a routine may be a strong pressure for other, closely-related routines to be transformed themselves, the interrelatedness of routines may cause unintended consequences even when only one routine is modified. See Kauffman (1993, pp. 33–67), in which he constructed a model with closely-related genes. He showed that even slight mutation of a gene may cause unexpected, radical changes of the fitness value of this entity, if genes are closely-related.

13) However, as argued above, it should be noted that the higher profitability in itself may not be necessary nor sufficient for survival of a firm. See Witt (1986), and Lee and Deguchi (2002).

14) Note that this is composed of two related branches; transaction cost economics and agency theory. However different their assumptions are, they share questions and basic theoretical framework to a large extent. In this paper, we ignore their differences and examine their *common* theoretical framework.

emphasized that, regardless of their answers, they posed important questions to be answered by any theories of the firm.

Attention should be paid here to the fact that new institutional theory of the firm also adopts the Friedman (1953)'s "survival of the optimal" assumption. As Milgrom and Roberts argued, because inefficient organizational forms are subject to criticisms by members or outsiders, such inefficiency is likely to be removed. Thus, "much of our analysis of organizations is based on the efficiency principle. We try to understand existing arrangements as efficient choices, and we interpret changes in these arrangements as efficiency-enhancing responses to changes in the environment within which the arrangements exist." (Milgrom and Roberts, 1992, p. 25) By adopting the natural selection argument, Williamson (1985) also shared this "survival of the optimal" assumption. According to Williamson, firms with non-optimal organizational forms in terms of transaction cost are selected away[16].

As a corollary of the argument in the previous section, it is not clear whether profit-maximizing organizational forms in terms of transaction cost and/or production cost tend to survive. As Winter (1991) argued, a change in transactions of a firm, for example, outsourcing production of parts, can seriously influence other characteristics of this firm, the capability of technological improvement, for an example. Generally speaking, at least for a time, as selection operates on the performance of a firm as a whole, "it is quite possible that a very good solution to one part of the system problem can carry the cost burdens of a member of blunders in other areas. In that case, the profit incentives and evolutionary mechanisms favoring the replication of overall success can lead to the replication of the blunders along with the competitive advantages of the total system" (Winter, 1991, p. 191), Thus, lowering transaction cost may cause productivity slowdown in the long run. Suppose two firms; while firm A has higher transaction cost and more effective efficiency-enhancing routines, firm B has lower transaction cost and less effective efficiency-enhancing routines. Then, it is not evident whether only firm B will survive in the end.

Therefore, if we wish to answer the question *why firms exist* by relying on the natural selection argument, as Williamson tried to do, then the dual-structured framework should be adopted again[17]. In this context, on the one hand, rules or customs which govern the interfirm relationships are

15) These branches have different perspectives on those issues, however. Agency theorists, on the one hand, have mainly paid attention to the *principal-agent problem* of contracting parties arising from information asymmetry. For them, this kind of problem should be avoided by devising efficiency-enhancing scheme of contract and/or property rights (Hart, 1989). For transaction cost theorists, on the other hand, assumptions of *asset specificity*, *opportunistic behavior*, and *bounded rationality* are essential. Especially, given *un*bounded rationality, it is possible to plan *ex ante* in spite of the presence of asset specificity and opportunistic behavior (Williamson, 1985, pp. 30–32).

16) "The argument relies in a general, background way on the efficacy of competition to perform a sort between more and less efficient modes and to shift resources in favor of the former. This seems plausible, especially if the relevant outcome are those which appear over intervals of five and ten years rather than in the very near term." (Williamson, 1985, pp. 22–23) At the same time, Williamson argued that if natural selection operates only weakly, relatively non-optimal firms may survive (Williamson, 1985, p. 23).

17) Williamson (1985, p. 23) also admitted that the natural selection argument adopted by him can "benefit from a more fully developed theory of the selection process." As argued repeatedly above, it should be emphasized that this dual-structured framework is essential for "a more fully developed theory of the selection process".

examples of relevant *routines*. On the other hand, an example of relevant *actions* in this context is the observable form of transaction, such as arms-length or long-term transaction. It is not until we examine the selection process explicitly, as Witt (1986) and Lee and Deguchi (2002) did, that we can conclude which routines, including transaction cost-minimizing[18] routine, are viable in the long run.

## 5 Concluding remarks

In this paper, based on the examination of an important debate, we have argued that the relevant framework of the theory of innovative enterprise should be *dual-structured* one, as far as we adopt the evolutionary framework. It should be emphasized that this kind of *dual-structured* framework is not merely an analogy of the theory of evolution in biology.

It is natural to raise a question here on the relationship between the two dimensions, namely, routine and action. If one dimension determines the behavior of the other, then we can understand the whole system just by examining the former dimension. For example, if the routine determines the action and not *vice versa*, then we can reduce the behavior of the whole system to the dynamics of routines. However, as shown in the preceding sections, this kind of reduction is not possible: On the one hand, the existence of a routine is certainly necessary for an action to be actually taken. On the other hand, however, the viability of a routine is sometimes determined by the viability of an action, because selection forces operating on the dimension of action may induce firms to remove routines which govern "inferior" actions. In addition, it may be the case that a routine is modified as a consequence of an action, "learning by doing" for example. As is easily understood by this brief argument, two dimensions interact with each other (Figure 2). If so, it is not straightforward to

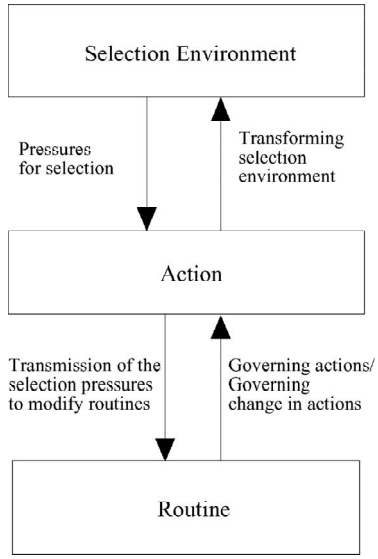


Figure 2: Interaction between routine and action

18) I do not claim here that transaction cost can be *actually* minimized.

understand the firm's behavior, because actions are governed by routines, which are again dependent on past actions. Thus, it is clear that we should investigate the interaction mechanism in order to understand the firm's behavior, such as technological or organizational innovation.

The understanding of this mechanism is relevant for various issues. For example, as Lazonick and O'Sullivan (2000) argued, it is questionable to assume that firms which aim to maximize "shareholder value" have higher innovative performance; it may be the case that less-profitable firms with more innovative routines are selected away and more-profitable firms with less innovative routines survive. In other case, shareholder value-maximizing firms may suffer so called "short-termism"; they may only *exploit* existing routines in order to behave efficiently without *exploring* new innovative routines, which may bring about stagnant performances in the long run.

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