

《論 説》

A Study on Inside Transactions of the Firm

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Introduction

The main theme of this paper exists in proposing a new idea regarding economic and uneconomic competition in the internal economy of the representative economic organization, for instance, the problems of the boundary and inside the firm and the sections.

In this paper I'll focus the coordinating power among the sections inside the firm. There are the two kinds of behavior between workers and employers, cooperative and hostile. These behaviors are implemented under the pressure of situations I called rivalry. They are utilized for deciding the level of transaction cost. The cost decides also the internal price and the section's advantage issuing from its own suitable negotiation, basing on the size of R & D.

The activity process of decision-making of such an organization is indispensable for the analysis and the boundary of the various internal organization. The internal economic analysis covers the important theory and the empirical knowledge of some hierarchical relations between members inside the firm, that is, employer as a principal and worker as an agent.

The rule of side in a triangle

At first briefly we'll describe the essence of the problem of prisoner's dilemma. Figure 1 shows the elementary payoffs of the representative prisoner's dilemma.

Each of two players-principal (employer) and agent (worker)-has two possible moves, obey and don't obey or let obey and don't let obey. Each player has a clear dominant strategy. Consider worker. Worker does not know which move employer is choosing. But as employer chooses the move, let obey, worker faces the move, obey payoff of 8 and the move, don't obey payoff 10.

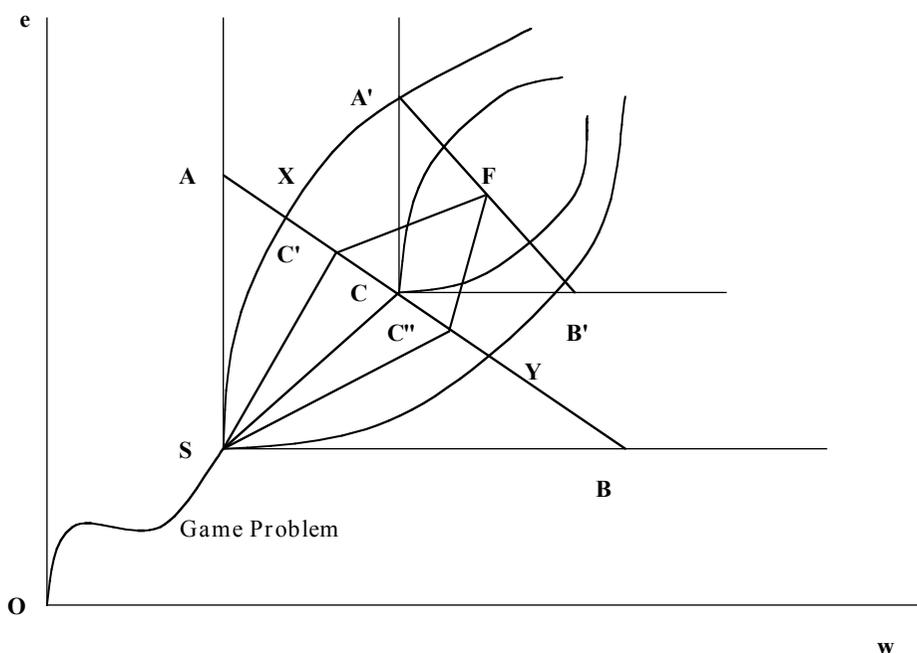
Whereas if employer chooses the move, don't let obey, worker faces the move, obey payoff of 0 and the move, don't obey payoff 1. In either case worker does better with the move of don't obey. Since the game is symmetric, employer's incentives are the same. In this case the dominant strategy equilibrium is the combination of the move, (don't obey, don't let obey) and equilibrium payoffs are (1, 1), which is worse than (8, 8) for both players. The sum of 16, in fact, means the largest possible combined payoffs for both players. The

Figure 1

		Principal (Employer)	
		let obey	don't let obey
Agent (Worker)	obey	(8,8)	(0,10)
	don't obey	(10,0)	(1,1)

payoffs to : (worker, employer)

Figure 2



prisoner's dilemma problem is non-cooperative games. In the internal economics, the most useful idea exists in the coordinating power for the mutual negotiation including cooperative behavior and hostile one.

There are interesting rules and knowledge regarding the dilemma between the worker's effort and the employer's productivity under his monitoring. I'd like to call it 'the rule of side in a triangle'. The story is as follows.

There is the part of two axes, that is, two sides in one triangle in Figure 2. One is the vertical side measuring worker's effort or employer's productivity e . The other is the horizontal side measuring employer's cost or worker's wage w . In general the player's moving to the northeast increases both e and w . However when one

player of them moves vertically to SA or does horizontally to SB from one attaining point S of prisoner's dilemma problem (i. e. the game problem), the one will gain some benefit, the other will lose. Summing up, moving to an upper right means the cooperative behavior and moving to right above or right beside does the hostile behavior. Worker as a agent has some discretion regarding e, while employer as a principal has some discretion regarding wage. Two sides SA and SB are longer than the length of SC. That is the reason why the hostile behavior becomes stronger than the cooperative one.

H. Leibenstein says, -The basic argument is that there are (1) conflicting interests between representative individuals in different hierarchically ordered groups, and (2) simultaneous, free-rider effort options for peer-group members. Both incentives tend toward a latent prisoner's dilemma solution-. The free-rider incentives mean that every worker wish to work as little as possible, even though he may desire that others work suitably effectively so that the firm and his job continue. These incentives are inevitable response of members inside the firm and exist at a lot of levels in the various internal organizations.

SY and SX in the figure are two curved divides issued from the point S. The point O is the origin locating in before the above mentioned game problem started. Therefore the segment OS indicates the practical process of that game problem. In general the divide means the boundary locus that one variable decreases, that of the other being constant. Inside the two divides the values of two variables, namely, effort e and wage w surely increase. While the cooperative behavior will lead to the point locating between the segment XY, for example, C, the hostile behavior will lead to inside of the two shadows areas SAX or SBY. Though C is the pareto-improving point compared to the point S, it is not the final attainment point. The attractive story will start from this point.

If the negotiation among the two does not result in success , the next one starts from the point C again. And likewise each behavior will lead to the point on the segment X' Y', for example, F, or inside of the two shadows areas CA'X' or CB'Y'. F is the pareto-improving point compared to the point C. When the coordinating power for the suitable negotiation is just the same among the two players, the locus will probably be the path SCF. If that power is different each other in the process of the negotiations in two times, the path will possibly be, for example, SC'F. Saying in details, if at the first time the employer's coordinating power is stronger (or weaker) than the worker's one and at the next time two players face the other way, the path will be SC'F (or SC''F), even though the final attainment point F is the same.

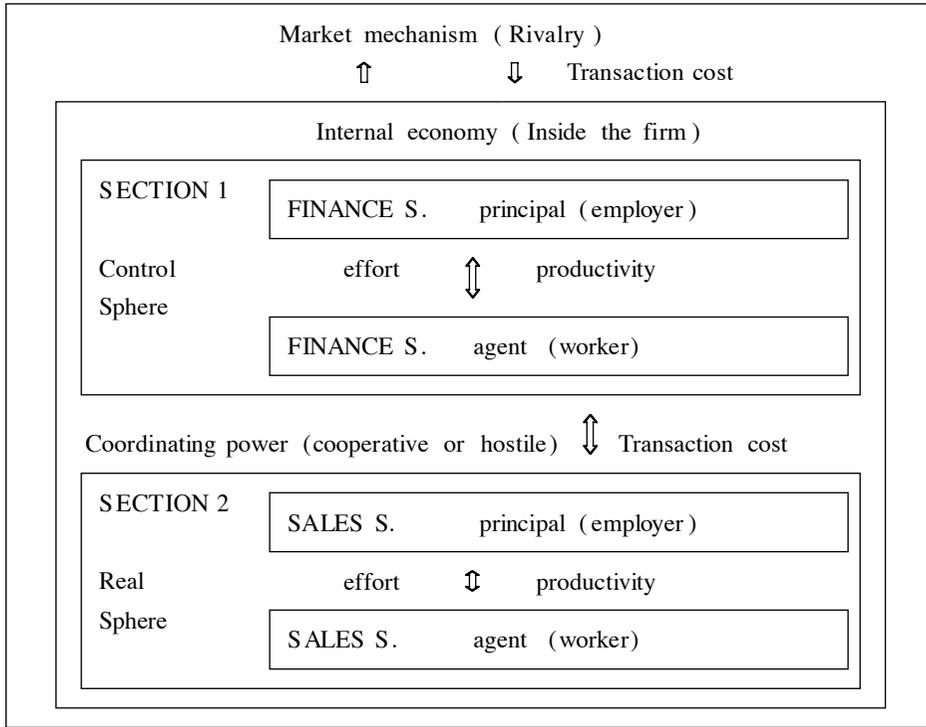
The coordinating power for the suitable negotiation will probably depend on the probabilistic factor θ . That is related with whether the worker will be able to gain the clear advantage over that of the employer or not. After that process the same things will be continued.

Basic theoretical framework

One is the model E. Rasmusen called a production game under uncertainty.¹ In this case of moral hazard the

1 Confer several Rasmusen's original model. 21. Rasmusen, E. (1989), pp. 21-24.

Figure 3



employer can feel it easier to observe the worker's result than his effort. Let me write r and e as the worker's result and his effort. The content of the timely contract is as follows. The employer as principal can propose the wage w for the worker as a agent. This is the content of the contract. When the agent agrees with the contract, he has to implement his effort e . His effort depends on his psychological state θ as an uncertain probabilistic factor.

And the principal can not observe the worker's effort level. This effort level leads to a certain result, i.e., the principal's productivity. We suppose that the result depends on his effort e and the state θ . Both of the players are able to observe the result. Concretely we can indicate

$$r = \theta + e$$

We also suppose that effort e is subject to $e(\theta)$ and e is always plus.

Payoff function of the agent is $P_a = K$ as a constant value k . That of the principal is $P_p = 0$, after the agent rejects his own contract. Effort becomes a kind of expected value. So taking in the same way payoff functions of two players are $P_a = v(e, r)$ and $P_p = v(r - w)$ after the agent receives his contract. Here $v(\cdot, \cdot)$ is payoff function.

Now the formula for determination of w is as follows.

$$w = a + b(r - a), \quad \text{subject to } 0 \leq b \leq 1$$

a and b are parametric values. This formula is called linear contract regarding w .

When $b = 0$, $w = a$ and when $b = 1$, $w = r$. The former is called the fixed-price contract and the latter is called the cost-plus contract. When $0 < b < 1$, the situation means risk-sharing contract.

After considering a kind of transaction cost, the profit of the firm π is as follows.

$$\pi = F(\Sigma P_a, \Sigma P_p, \Sigma c) = F(\mathbf{r}, \mathbf{w}, \mathbf{c}) = \mathbf{r} - \mathbf{w} - \mathbf{c}$$

\mathbf{r} , \mathbf{w} and \mathbf{c} are each vector in regard to several sections in the organization concerned.

\mathbf{c} is cost which will occur in their contracts. It is called transaction cost. The sign Σ means the sum regarding each section.

The principal maximizes π subject to two constraint conditions. The first is the 'delay condition' taking time before the final determination. This is one rational method each the principal can save the risk accompanied by the final decision under uncertain situations. Every so often the final value of a behavior is larger than that of a formal behavior by taking some timely delay. The second is a kind of coordinating cost coming from using the coordinating power. For the internal economic analysis the introduction of the transaction cost are very important considerations. Let us talk about the transaction cost as main cost for mutual coordination inside the firm. Generally speaking this cost means the total cost for coordinating among the sections in the organization concerned. Beside we can include the risk-taking cost accruing from the mutual negotiation.

To be brief, the game problem usually involves situations in which things turn out badly for the all, when people try to do the best for themselves. That is the reason why such games contain two kind of cooperative and hostile behaviors. We can find a vital problem in discussing the dilemma between the worker's effort and the employer's productivity. How should we distinguish the two indices, namely, the worker's effort and the employer's productivity and coordinate their significant values inside the firm?

Figure 3 depicts the survey of the above the internal framework among sections.

A coordination problem-rivalry among sections-

We can draw an idea concerning the pressure of competition among sections inside the firm. In according to new demand theory by K. Lancaster we try to introduce two characteristics which two members, that is, the worker and the employer have. One is the expected value of the worker and the other is that of the employer. The former is basing on agent's own coordinating power and the latter is basing on principal's own one. Generally the value of the firm is decided as the weighted sum of two values, depending on the sizes of these two powers.

Now there are four sections providing these two values inside the firm. These are named production, finance, sales and development. We can consider the finance section has much authority and the largest share of the section inside the firm. The next Figure depicts some of combination of the above two values. We can call the boundary line of ABCD with four corners 'characteristic frontier'. Every point on this frontier is able to produce

an efficient set of values. But every point on such three partial segments, for example, AC, BD and AD can't produce it enough. Because these three partial segments locate usually inside of characteristic frontier area OABCD concerned. The players never choose the points on these segments in the area OABCD. The reason is because the members of the firm should like to produce the more efficient values. *Ceteris paribus*, only when the set of the expected values of finance section increases, point B has to move in the direction of the northeast. If the extent of this increase is rather large, the new characteristic frontier must be drawn as the new segment AB'D. Then the point C probably will come inside this new frontier.

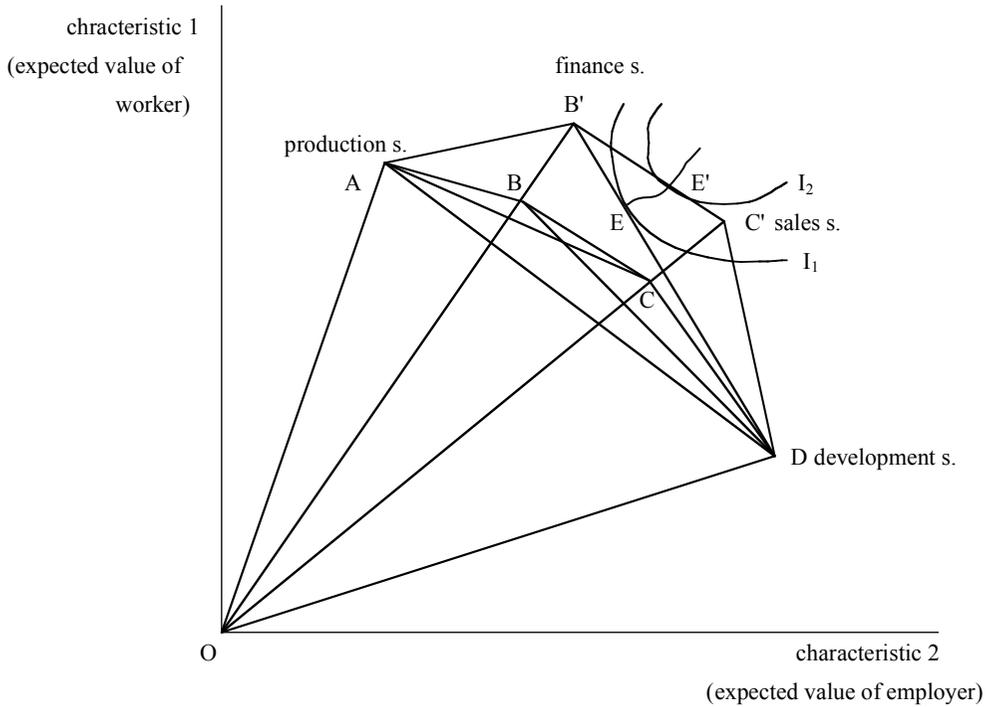
Therefore the firm can desire to increase the set of two values of finance section more. But one worrying thing will occur here. There happened to be in the pressure of rivalry between hostile behavior and cooperative one in the several sections. Rivalry, especially, inside of the section is new-oriented word. The rivalry isn't mere economic phenomena. It includes both the economic-cultural and political aspects inside the firm. To put it shortly, rivalry means the close combination of the two countervailing powers with the cooperative behavior and the hostile behavior. In this situation we can expect that the value increasing in the finance sector may induce the value of the other sections to increase, owing to a kind of the effect of monitoring. In fact the value of the finance section is stable and regular. It will steadily increase, if possible. This fact surely will increase the firm's profit. Because the finance section belongs to the control sphere in the organization, while the other sections belong to the real sphere. If the increase of the value of the finance section is unstable and irregular, some of the other sections are suppressed by the pressure of rivalry and have to exit from there. When B moves to B', the point C of the sales section will drop inside the new area OAB'D having a new frontier AB'D. But if C moves to C', the next new characteristic frontier will be OAB'C'D again. This is a worrying point of coordination problem among sections concerned. The troubles often happen as the result of the countervailing behaviors, namely, cooperative and hostile.

The first change of one section will set up a chain reaction of change of other several sections. We can know the change of relative internal price, i.e., the ratio of two player's expected values at each section. As we see later, this internal price depends on both the transaction cost and the tactics of negotiation. In the figure 4 there are two indifference curves I_1 and I_2 . I_2 has higher expected values than I_1 . We can regard this indifference curve as the preference inside the firm. The final optimal point is not the tangent point E between the segment B'D and the curve I_1 , but the tangent point E' between the segment B'C' and the higher curve I_2 . The curve EE' is a part of efficient locus being depicted in coordinating process inside the firm. Figure 4 shows the above two values approach. That will proceed under the pressure of rivalry among several sections.

Transaction cost problem-the value of the section's advantage-

We introduce four terms adopted by the section concerned, that is, state (θ), effort (e), result (r) and expected value (v). Term θ explains his own psychological state he can control by himself. Term e explains the worker's effort. Term r explains the employer's result or his productivity basing on the terms e and θ . Term v explains the

Figure 4



size of the value brought by r . Formulating the above meaning, we write

$$r(e, \theta)$$

$$v(r(e, \theta)) = v \cdot r(e, \theta) = f(e, \theta)$$

Considering the probability variable θ meaning worker's psychological state. The expected value is

$$v(e) = \sum_{\theta} f(e, \theta) \cdot \theta$$

Maximizing $v(e)$,

$$v_0 = \text{Max} \sum_{\theta} f(e, \theta) \cdot \theta$$

When we consider conditional probability $p(G / \theta)$, using the credibility of the player's advantage (G) in the pressure of rivalry. Using the mutual coordinating power, the posterior probability $p(\theta / G)$, applying the likelihood of the information, we get the next Bayesian formula

$$p(\theta/G) = \frac{p(G/\theta) \cdot \theta}{p(G)} = \frac{p(G/\theta) \cdot \theta}{\sum_{\theta} p(G/\theta) \cdot \theta}$$

In the above formula $p(\theta/G)$ means probability for getting the advantage G when actually the state θ occurred and at the same time means the posterior probability which the state θ occurs when the advantage G was brought. The value $p(G)$ is probability getting the advantage G .

Then we get

$$v_1 = \text{Max} \sum_{\theta} f(e, \theta)p(\theta/G)$$

Therefore net value of the advantage concerned (v) is

$$v = v_1 - v_0$$

When v is positive, the rational section will dare to pay the transaction cost to get its own advantage G in the pressure of rivalry. As I mentioned before this is the transaction cost c for managing successfully the coordinating power toward the other sections. This cost is indispensable and plus. Basing on this v , at first the above-mentioned P_a and P_p are decided and next, the firm's profit is decided according to the given formula, namely,

$$\pi = F(\Sigma P_a, \Sigma P_p, \Sigma c) = F(\mathbf{r}, \mathbf{w}, \mathbf{c}) = \mathbf{r} - \mathbf{w} - \mathbf{c}$$

after considering the wage w of the worker.

The coordinating mechanism and rivalry

The domestic and international war in the main industries seems to be harder at the entrance of the 21st century. Many economic researchers predict that the efficiency of industrial organization depends on the extent of competition brought by the market mechanism. They believe the larger the extent of competition in market mechanism becomes, the larger the extent of efficiency in that place becomes. On the whole this prediction seem to be right. But is this prediction true inside the firm? The market mechanism does function as a grand coordinating organization, only when it is supported by the other coordinating mechanism characterized in the non-marketable place.

In this paper new word 'rivalry' is coming into the behavior of the sections inside the firm. Under the pressure of rivalry each section produces the differential products and at the same time has many competitors inside the firm. I should like to use a concept of rivalry without reject the well-known word competition. In fact there are many situations in which the pressure of competition is too little and that of rivalry is too much. We need to remember that the pressure of rivalry isn't equivalent to that of the so-called competitive oligopoly. The things conditioning this concept are as follows. The first is that the average cost is more important than the marginal cost. The second is that the internal price is not decided by the strict rule of the market, namely, so-called equilibrium of demand and supply inside the organization. The third is that the differentiation of products surely exists as the unsymmetrical advantage among the sections.

Above-mentioned H.Leibenstein indicates that the conventions are related to three problems. The first is the

coordination problems. The second is possible conflict problems. The third is the strategic decision problems. As in general we don't think the conventions will intend any strategic decision problems in the internal organization, we will have only the above two problems here. Also he points suitably that the conventions mean a regularity of behavior that has a high degree of adherence locally and a high degree of expectation others will adhere to it. We are able to discern the visible and invisible differentiation among the typical products made by each section. The hostile behavior takes place frequently between the different sections. The mixed action of the hostile behavior and the cooperative behavior in each section decides the degree of negotiating power and or the size of the transaction cost.

Generally speaking we find that a section considers two factors in order to acquire its own advantage inside the firm. One relates to the transaction cost, the other relates to the differentiation of products. The former is price typed, the latter is a brand typed. We can write out the following functions.

$$(\text{internal price}) = f(\text{transaction cost, technology of negotiation})$$

$$(\text{internal brand}) = g(\text{differentiation of products, share of section})$$

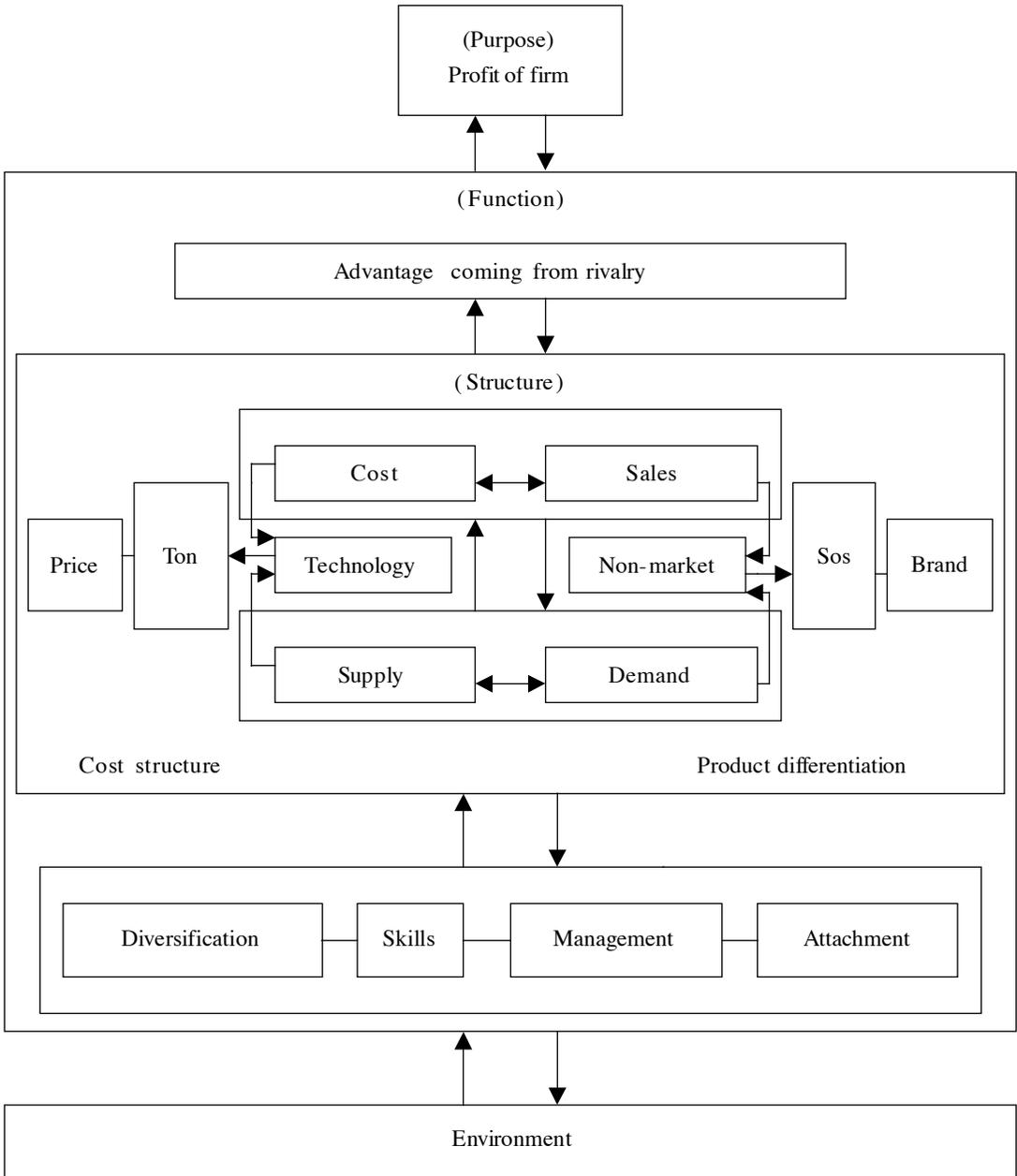
The internal price is determined by the rule of full-cost principle basing on the transaction cost. In that case full-cost coefficient depends on the technology of negotiation (Ton). Brand is determined by the rule of full-cost principle basing on the differentiation of the products. In this case the internal brand depends on the share of the section (Sos) besides. The return of investment for R & D in the section is vital in considering both the transaction cost and the technology of negotiation in the internal price formula. Likewise the authority of the section is vital in considering both the differentiation of the products and the share of the section in the internal brand formula. We will suitably be able to consider the analogy of, for example, so-called inside of makers of the semi-conductor industry.

To be sure the final purpose of going concern of every section is increasing the firm's profit by raising the share of the section. There are four peripheral features which one section has and the other section has not. Two of them are the diversification and the skills. The diversification means the various levels of coordinating power. The skills mean the various levels of the technology of negotiation. The others are the attachment and the management. The attachment means the informal partnership among the sections and the management means the informal monitoring inside the firm. We will use these four terms in order to explain a purposeful firm system.

In Figure 5 we depict a purposeful firm system. This purposeful system approach depends on the ideas of R. L. Ackoff and F. E. Emery. Three key concepts are structure, function and purpose. Structure contains the transaction cost and Ton, differentiation of products and Sos in the above couple of functions. Function relates to the advantage of the section issuing from the pressure of rivalry with four peripheral features, namely, diversification, skills, management and attachment. Structure is a subsystem of function and includes all factors deciding the internal price and the internal brand. Environment means the market mechanism including all other firms and industries.

Figure 6 shows us a classification of structure and function in question. The 'Multi-multi' in the column

Figure 5



means the different structure in the same or the different environment. The 'Uni-uni' in the row means one function in one environment. The 'Uni-multi' in the row means one function in any one environment and the different function in the same or the different environment. The 'Multi-multi' in the row means the different function in the same or the different environment. In the above figure each entry is named 'Active functional

Figure 6

Structure	Function		
	Uni-uni	Uni-multi	Multi-multi
Multi-multi	Active functional program	Active multi-functional program	Active double multi-functional program
	Single program	multi-program	ultimate-program
	Western type	Asian type (including Japan type)	Ideal type

program', 'Active multi-functional program' and 'Active double multi-functional program' in order. The 'Single-program' means only market mechanism. The 'Multi-program' means both market mechanism and non-market mechanism. The 'Ultimate-program' means more elaborate version than the 'Multi-program'. We call the 'Multi-program' Ideal type. As a result there are three types in all, that is, Western type, Asian type (including Japan type) and Ideal type.

Some lessons from the full-cost formula and others

We need to research some additional lessons regarding the competitive industry under market mechanism, so to speak, 'outside the firm'. That is related with the various cost effects under the pressure of rivalry accompanied by the market. As I mentioned before, the supply of the products of the firm depends not only on the learning effect in regard to the differentiation of products but also the return of investment for R & D inside the firm. In order to compete with another firm under the strong pressure of rivalry, this learning effect will serve to induce the firm's price to fall somewhat. For example, the semi-conductor firm must use the learning effect in addition to the scale economy effect. This is an effective policy of the manufacturing firm for which the firm decreases its own risk and cost issuing from the innovational technology.

Likewise the section inside the firm can compete through their reciprocal cooperative partnership and at the same time can tide over the pressure of strong rivalry among sections. The fresh game between rivalry and partnership need searching the advantage issuing from the coordinating power of the section concerned. In other words the grand game with some players has just begun to grope for 'ultimate program' as the Ideal type in figure 5. Saying from a view of the aspect of rivalry, both the technological advantage and the informational advantage are not always dependent on the mutual interaction of demand and supply.

In the pressure of rivalry any firm can't survive unless it utilizes the new opportunity of the advantages coming from the technology and information. As J. A. Schumpeter taught us, the firm's opportunity for the profit disappears at the equilibrium point. The reason is that the marketable competitive power will disperse

among all firms. He says that at the equilibrium point the firm cannot have any strong incentive to create the new opportunity of the advantages coming from the technology and information. Also at the equilibrium point, the firm can only break and readjust the market by using his own knowledge of society as F. A. Hayek taught us. Saying paradoxically while the pressure of rivalry begins, that of competition ends. The firm always has to endeavor to increase the advantages coming from using the market mechanism outside the firm. Generally speaking the good prospects for advantages coming from the technology and information will drive him to readjust the market. The behavior accompanied by both the technological advantage and informational advantage, for example, the investment for R & D is very important and feasible the firm's strategic behavior. Compared to the recent situations between U. S. and Japan, we can see some troublesome points between two countries. Which of them is the most critical?

The rivalry isn't mere economic phenomena. It includes both the economic-cultural and political aspects. To put it shortly, rivalry means the close combination of the cooperative behavior and the hostile behavior in pursuit of both the technological advantage and informational advantage. In Japanese society people don't always hate for having the same opinion as the others'. So they don't be worried about troublesome things between the others' opinions. In this society there is a basic structure of one strong rope tied up into a bundle, with their standing side by side. But in the other countries' societies each member looks like a massive and heavy stone bound loosely by a thin rope. When one of them starts to move, the other doesn't move and is standing still with no influence each other. Probably this is something of democracy. Speaking in the same way, when one stone starts to move, every stone starts to move all together. This really happens when people has the close combination of the cooperative behavior and the hostile behavior in pursuit of their own advantages. It is something of the harmony every person has as a rational convention.

As I mentioned before regarding the sections inside the firm, H. Leibenstein indicates that the conventions are related to three problems. The two are the coordination problems and the possible conflict problems. The third is the strategic decision problems. Though we considered the conventions will not intend any strategic decision problems in the section, we have the above three problems in this time. He also pointed suitably as followings : the conventions mean a regularity of behavior that has a high degree of adherence locally and a high degree of expectation others will adhere to it.² M. Morishima suitably showed his unique view regarding Japanese economic-cultural relations. He is based on the great thought of the so-called Christian spirits and capitalism of M. Weber. Of course his work is merely one tried essay, but very much stimulating. But no matter how eagerly he endeavored to search the role of Confucianism in Japanese history, I wonder yet whether the religious spiritual climate in the country will be able to explain the main cause of the socio-economic success in the industrial developed economy. It is difficult for us to answer a vital problem, that is, " Which country and why

2 H. Leibenstein says : -By an institution we mean nonlocal convention. Conventions are the basic components, but not all conventions are institutions. A separation of these two concepts, and their relation to each other, has to be worked out. Once established, conventions have an inertial tendency to persist that discourages individual adaptations to changing circumstances, which again makes suboptimality likely. -, 15. Leibenstein, H. (1987), pp. 61-73.

has succeeded or will be succeed?'. The success of the country is basing on both the rational ground and the conventional ground.

I am interested in the optional amount of the firm's profit in the case of changing the equilibrium price upwards or downwards. A great interest for us exists in whether the firm will be able to expand his profit by falling his price, not by raising it. Many economists will believe that the effect of the price change on the profit depends on the extent of competition in the market. Is this belief agreeable? It is important of us to notice the difference of two terms, namely, 'perfect' and 'excessive'. The above two words look like even similar meaning at a glance. The former means the pressure of competition is excessive but the latter means the pressure of monopoly is excessive. I like to propose that little competition means much rivalry, not much monopoly.

Now the new word 'rivalry' does not yet acquire its citizenship in a well-known standard economic theory. Though in the theory of rivalry every firm produces the differential products each other, he has many competitors in the market. Many outstanding economists have taught us the requisites of 'perfect competition'. They are the innumerable participants, the homogeneous products, perfect information and the free entry and exit. But these are only necessary conditions, not the sufficient conditions. The concept of rivalry can satisfy both the necessary and sufficient conditions as it includes both the economic-cultural and political aspects. It is surely the wide and flexible concept.

There are two factors affording the well-known creative destruction. One is about the price formation and movement of the products. The other includes 'innovative variable'-the investment for R & D and the like-and 'strategic variable' -the differentiation o products and the like. We dare to call them the conventional variables CV. The innovative variable is closely connected with strategic one. When the firm succeeds in the investment for R & D and / or differentiation of products, he is probably able to expand his profit. These variables often cause rivalry in behalf of competition. J. A. Schumpeter told also us about the discontinuity of economic development, -in general it is not the owner of stage-coaches who builds railways-. This fact puts the discontinuity of the process of the equilibrium in a special light, especially, in that of the pressure of rivalry.

The advantage by this pressure of rivalry can induce the firm decrease the transaction cost. And sooner or later a drastic the falling of price is realized under the pressure of rivalry after the falling of cost. J. A. Schumpeter told us, -The capitalist achievement does not typically consist in providing more silk stockings for queens but in bringing them within the reach of factory girls in return for steadily decreasing amounts of effort³-. This teaching is probably right.

We can think that the success of the firm is basing on the investment for R & D in the firm. On the analogy of the above, the suitable two behaviors, namely, cooperative and hostile will bring the falling of the cost among the sections inside the firm. Saying paradoxically, we can say also the success of the falling of the cost in the sections will induce the additional investment for R & D.

The change of the price depends on that of the cost. Formulating this context, full-cost principle is

3 27. Schumpeter, J. A. (1942), pp. 66-68.

$$P + \Delta P = (LAC + \Delta LAC)(1 + m + \Delta m)$$

$$\Delta m = f(\Delta P, \Delta LAC, CV)$$

At this place the terms p , LAC , and m are price, average cost in the long-run and full-cost multiplier. The sign Δ means the part of the change. We can say full-cost multiplier m changes with the height of the return of the investment for R & D. For instance most of technological analysts say the larger pieces of chip engineers can get from a piece of wafer, the better technological precision they have on a piece of chip. In this semi-conductor industry the degree of precision of the technology depends just on how many pieces of chips they can cut off. The sufficient falling of the cost enables them to sell at lower price and to increase their own share in the market. This fact induces them to implement the larger investment for R & D. The return of this investment issuing from the conventional variable CV determines full-cost multiplier $m + \Delta m$ with the parts of changes of P and LAC , i. e., ΔP and ΔLAC . The characteristic in point is that we can see the falling of price in the long run. That is the reason why the firm is able to keep up the larger profit basing on the larger advantages. This response of the firm will bring the more suitable full-cost multiplier, i. e., $m + \Delta m$.

Now the basement of economic behavior is no doubt market economy. Market economy means typical mode of economic transaction using mainly market mechanism. We have two problems here. One is whether several organizations in outside negotiation can offer any open opportunity for free transaction to his partners or not. This triggers a clear friction of shares between several organizations. In the case of two organizations it brings unusual negotiating friction between them. Saying more ironically we used to be able to see some phases of typical economic negotiation, for example, between Japan and U.S. outside the firm or finance section and the sales section inside the firm.

The following are about characters of rivalry of the industries concerned. The main difference between competition and rivalry consists in the degree of discretion in controlling the price. Rivalry holds good to make clear discretion of the non-price variable. Sooner or later a drastic falling of price is realized through the falling of cost. In practice every semi-conductor maker is characterized by the imperfectly integrated organization. Generally speaking the highly integrated firm has surely both the larger efficiency and the larger coordinating power. Even organizational scientists cannot afford to understand the mechanism of rivalry coming from the mutual comparative advantage rightly. For instance the typical firm producing both whisky and beer can always invest a large amount of money earned at the branch of whisky into that of beer. In the same way the sections whose main products has the larger share inside the firm can invest the money earned at the active branch into the inactive but promising branch. This is an effective method saving the risk under the pressure of rivalry. What is the theoretical framework explaining the industrial context of these features? There are three vital features. The first is the probability of the vertical integration. The second is the prospect of the additional investment for R & D. The third is the coordinating power under the pressure of rivalry. All of three features belong to supply side factors. These supply side factors have some parallels with the demand side factors. Finally the change of the relative internal price among products can bring a clear advantage regarding the ratio of the two expected

values.

Conclusions including some remarks

As the other economic-cultural aspect we should like to advise that a notorious second rule of thermodynamics has told us that entropy travels straight to thermal death leaving the situations alone. Human beings are able to use their wisdom systematically and effectively, by creating, accumulating, processing and storing their own score. So they can put increase of entropy back skillfully. The public interest means the total of social surplus, namely, the sum of the consumer's surplus and the producer's surplus, being supported by the budget constraint and created by the individual interest. In our human society the social surplus will be distributed among the sections after all. As it were this logic is the same kind of timber or iron frame industry. I wonder we can discuss these strange features with plentiful satisfaction through well-known traditional microeconomic theory?

In the near future the clever sections can tide over the strong pressure of rivalry and survive by using skillfully both the cooperative behavior and the hostile behavior inside the firm. The fresh game between these two countervailing behaviors has just begun. The struggle between rivalry and partnership has just begun. In other words we researchers have just begun to pull out to sea in pursuit of the grand design -"ultimate program" in the above-mentioned figure-.

References

1. Ackoff, R. L. and F. E., Emery (1972), *On Purposeful System*, Tavistock Publications.
2. Alchan, A. A. and H., Demsetz (1972), "Production, Information Costs and Economic Organization", *American Economic Review*, Vol. 62.
3. Aoki, M. (2001), *Toward a Comparative Institutional Analysis*, M. I. T..
4. Arrow, K. J. (1974), *Limits of Organization*, W. W. Norton and Company, Inc..
5. Besanko, D, Pranove, D and M, Sharply (1996), *The Economics of Strategy*, John Wiley and Sons, chaps. 1-9.
6. Blair, R. D. and L. W., Kenny (1987), *Microeconomics : with Business Applications*, John Wiley & Sons, Inc..
7. Coase, R. H. (1937), "The Nature of the Firm", *Economica*, Vol.4.
8. Coombs, R. et al. (1987), *Economics and Technological Change*, Macmillan Publishing Company.
9. Dixit, A. K. (1996), *The Making of Economic Policy : A Transaction Cost Politics Perspective*.
10. Ghenmawat, P. (1995), "Competitive Advantage and Internal Organization : Nucor Revisted", *Journal of Economics and Management Strategy*, Vol. 74, No. 3, pp. 685-717.
11. Holmstrom, B. and P. Milgrom, (1994), "The firm as an Internal System", *America Economic Review*, Vol. 84, September, pp. 971-991.
12. Hayek, F. A. (1945), "The Use of Knowledge in Society", *American Economic Review*, Vol. 35, No. 4.
13. Jensen, M. C and W. H., Heckling (1976), "Theory of the Firm : Managerial Behavior, Agency Costs and Ownership Structure", *Journal of Financial Economics*, Vol. 3.
14. Kornai, J. (1972), *Anti-equilibrium*, North-Holland.
15. Lancaster, K. *Consumer Demand : A New Approach*, (1971), Columbia University Press.
16. Leibenstein, H. (1980), *Beyond Economic Man*, Harvard University Press.
17. Leibenstein, H. (1987), *Inside the Firm*, Harvard University Press, chaps. 2, 5-8, 11-14.

18. Milgrom, P and Roberts, (1992), *J. Economics, Organization and Management*, Prentice Hall, chaps. 2–7, 10, 16.
19. Morishima, M. (1984), *Naze Nihon wa Seiko Shitaka (Why has Japan Succeeded)*, TBS Buritanika.
20. Odagiri, H. (2000), *Kigyō Keizai-gaku (Economics of the Firm)*, Toyokeizai Shinposha.
21. Porter, M. E. (1990), *The Competitive Advantage of Nations*, Macmillan Press.
22. Posner, R. A. (1974), “Theories of Economic Regulation”, *The Bell Journal of Economics and Management Science*, Vol. 5, autumn.
23. Rasmusen, E. (1989), *Games and Information : An Introduction to Game Theory*, Basil Blackwell Ltd..
24. Schumpeter, J. A. (1925), *The Theory of Economic Development*, Cambridge.
25. Schumpeter, J. A. (1942), *Capitalism, Socialism and Democracy*, Harper and Row.
26. Shepherd, W. G. (1997), *The Economics of Industrial Organization : Analysis, Markets, Policies*, Prentice Hall.
27. Simon, H. A., (1951), A Formal Theory of the Employment Relationship, *Econometrica*, Vol. 19.
28. Stigler, G. J. (1971), “Theory of Economic Regulation”, *The Bell Journal of Economics and Management Science*, Vol. 2, spring.
29. Suits, D. B. (1973), *Principles of Economics*, Harper and Row Publishers, Inc..
30. Takemura, S. (1988), *Keizaisisutemu to Johokeizai (Economic System and Informational Economy)*, Tokyo Moriyama Shoten Publishing Company.
31. Takemura, S. (1997), *Sangyo to Kyoso no Keizaibunseki (Economic Analysis of Industry and Competition)*, Ochanomizu Shobo Publishing Company.
32. Takemura, S. (1999), “ Thinking and Observations of Industrial Policy and Regulation” in *The Current State of Economic Science*, Vol. 4, ed : S. B. Dahiya, Spellbound Publications Pvt. Ltd..
33. Takemura, S. (2000), “Implications of Competitive Power of Schumpeter’s Theory” in *Economic Theory in the Light of Schumpeter’s Scientific Heritage* Vol. 2, eds : V. Orati and S. B. Dahiya, Spellbound Publications Pvt. Ltd.
34. Takemura, S. (2003), “Toward an Internal Economic Analysis” in *The Future of Economic Theory in 21st Century*, ed : K. Puttaswamaiah, Transactions Publishing Company (forthcoming).
35. Williamson, O. E. (1975), *Markets and Hierarchy : Analysis and Antitrust Implications*, The Free Press, chaps. 3–4, 10–12.
36. Williamson, O. E. (1985), *The Economic Institutions of Capitalism*, The Free Press.
37. Williamson, O. E. (1986) *Economic Organization : Firms, Markets and Policy Control*, The Free Press.

A Study on Inside Transactions of the Firm

Shosuke Takemura

It's time to think over the appropriateness for the present and the prospects of economics. That work should be full of sufferings. In this paper I'll focus the coordinating power among the sections inside the firm. There are the two kinds of behavior between workers and employers, cooperative and hostile. These behaviors are implemented under the pressure of situations I called rivalry. They are utilized for deciding the level of transaction cost. The cost decides also the internal price and the section's advantage issuing from its own suitable negotiation, basing on the size of R & D.

The activity process of decision-making of an organization is indispensable for the analysis and the boundary of the various internal organization. The internal economic analysis covers the important theory and the empirical knowledge of some hierarchical relations between members inside the firm, that is, employer as a principal and worker as an agent.

'Inside Transactions of the Firm' looks like to be so attractive. The last section-the coordinating mechanism and rivalry-includes the great ideas. People try to do the best for themselves, when things turn out badly for the all.