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in a Competitive Environment: Toyota and Nissan**

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August, 2000

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## 1. Introduction

It is often observed that a firm exhibits particular organizational ways of common thinking and working. Such shared norms and value judgements are, as a whole, called corporate (organizational) culture. It provides the members with decision criteria and guidelines to resolve conflicts.<sup>1</sup> We can find such a “culture” not only in the organization of a firm but also in the relationships between a manufacturer and its distribution channel of dealers. Makers and their channels like those in the automobile industry have specific assets accumulated through frequent and continuing transactions between themselves. They also generate some kind of “culture” as an important complement to incomplete written contracts to preserve the value of specific assets against contingencies.

In this paper we examine competing distribution channels, in each of which, efforts by dealers are unverifiable though observable by the manufacturer, and the members in a channel can not make contracts with respect to effort levels. We introduce a Bergson-Samuelsón welfare function for the dealers as a means to supplement this incompleteness.<sup>2</sup> That is, dealers are assumed to expect that the maker will divide the rewards to maximize the welfare function. Such a welfare function could be seen as a kind of corporate culture that possibly is generated over a long time.<sup>3</sup> When two channels are associated with

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<sup>1</sup> For the research on corporate culture in the field of organization theory, see Deal and Kennedy (1982), Peters and Waterman (1982), Schein (1985), Nonaka (1985), Schneider (1990), Denison (1990), and Kotter and Heskett (1992). These authors emphasize the importance of culture as a norm to induce practical implications, but their arguments are not always clear about which elements of culture affect an organization’s performance. On the other hand, Kreps (1992) treats corporate culture as a game-theoretic equilibrium in behavioral patterns of interdependent individuals. It is questionable, however, whether the usual equilibrium strategies can cover the concept for which the word “corporate culture” is used.

<sup>2</sup> Grossman and Hart (1986) and Hart and Moore (1990) consider ex post negotiations to divide common profits as a complement to the incompleteness of written contracts.

<sup>3</sup> Aoki and Okuno (1996, Ch.1.2.1) mention an idea similar to ours, that a “culture” can be treated as a

different cultures, or different welfare functions, the dealers in each group have different expectations about the distribution of rewards. Ray and Ueda (1996) consider a model of a group with a welfare function for the members, and find that the group shows the better performance when it has a more egalitarian welfare function. Bearing distribution channels in mind, we will analyze a simple model of groups with welfare functions competing for market shares and show that the group associated with the more egalitarian welfare function obtains the larger share. This conclusion implies that the finding of Ray and Ueda is robust in the case of several groups competing for market shares.

But the main message of this model is that the degree of egalitarianism can be an important criterion to classify corporate cultures. Taking the case of the channels of two major Japanese automobile manufacturers (Toyota and Nissan), we will examine the adequacy of this argument and derive positive observations. The existing studies of corporate culture do not necessarily make clear what aspect of it affect the performance of an organization in a competitive context. Our argument provides a new insight to clarify the relationship between the performance of a competing organization and its culture.

In the next section, a model of competing channels for market share is introduced to formally analyze the relationships between corporate culture and market share. Section 3 is devoted to a case study of the distribution channels of Toyota and Nissan in Japan. The differences between the two channels in culture and sharing rule are outlined, with a brief history of the construction of the channels, and the relation between these differences and market share is examined. Section 4 gives a summary and conclusions.

## **2. A model of competing channels for market share**

### 2-1 Assumptions and notations

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value judgement represented by a social welfare function. They also argue that it should be distinguished from an “institution,” which is an equilibrium pattern of behaviors.

Consider  $m$  distribution channels in a market. The  $i$ th channel consists of  $n_i$  dealers providing the product of the  $i$ th maker. The effort level of the  $j$ th dealer in the  $i$ th channel is denoted by  $x_{ij}$ , and the sum of the effort in the  $i$ th channel is denoted by  $X_i$ . We assume that the share of the  $i$ th channel  $S_i$  is given by the ratio of  $X_i$  to the total effort of the all channels,  $X$ . That is,

$$S_i = \frac{X_i}{X} = \frac{\sum_{j=1}^{n_i} x_{ij}}{\sum_{h=1}^m X_h} \quad (1)$$

Our main concern is how different cultures in the ways to treat dealers show different economic performance. To consider this question as simply as possible, we will not discuss the division of profit between a maker and its dealer explicitly. Instead, it is assumed that the total rewards for the dealers in a distribution channel would be increasing with respect to market share in a relevant range of effort levels.<sup>4</sup> The simplest representation of this is using the share of the  $i$ th channel  $S_i$  itself as a proxy of the total rewards for the channel. Henceforward, we will adopt this assumption. Let us specify the utility of the  $j$ th dealer of the  $i$ th channel,  $u_{ij}$ , as follows:

$$u_{ij} = \log y_{ij} - x_{ij}, \quad (2)$$

where  $y_{ij}$  is the rewards distributed to the dealer.

The  $i$ th channel is associated with a Bergson-Samuelson welfare function

$$W_i = \left( \frac{-1}{a_i} \right) \cdot \left( \sum_{j=1}^{n_i} [\exp(-a_i \cdot u_{ij}) - 1] \right), \quad a_i > 0 \quad (3)$$

The maker using the  $i$ th channel and the dealers share the value judgement that the rewards for the channel should be shared to maximize this welfare function. In this sense, this welfare function represents a kind of “channel culture”. The parameter  $a_i$  can be seen as the “degree of egalitarianism” in the sense that the

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<sup>4</sup> We present a brief discussion of the adequacy of this presumption in Section 4.

welfare function with the higher value of this parameter prefers to decrease the differences of utility levels among members.<sup>5</sup> The following geometric argument may help to understand the intuitive meaning. Figure 1 shows an iso-welfare curve for two dealers of the  $i$ th channel, given other dealers' utility levels. The curvature of this function rises as the value of  $a_i$  goes up. Thus, the welfare function with a higher value of  $a_i$  permits a lower utility level for both dealers to reduce the difference of these values. When  $a_i$  goes up to infinity, the welfare function converges to the "Rawlsian" welfare function, and the welfare level of the channel depends only on the lowest value of utility among members. On the other hand, when  $a_i$  converges to 0, the welfare function converges to the "utilitarian" welfare function. Only the sum of utilities of the dealers matters, and the distribution between them is ignored.

Given the values of  $m$ ,  $n_i$ , and  $a_i$  ( $i=1, \dots, m$ ), we will consider the game of competing channels in which every dealer determines the effort level simultaneously to maximize utility. To choose the effort level, a dealer belonging to a distribution channel uses the knowledge that the maker employing the channel will distribute the rewards to maximize the associated welfare function to the maker and the channel. Then each channel's market share and each dealer's utility are given as a Nash equilibrium.

## 2-2 Distribution within a channel

To derive a Nash equilibrium, we need to know what distribution rule a channel takes. Consider the  $i$ th channel. Given the rewards or the share  $S_i$ , it is divided to maximize the associated welfare function. By using (2) and (3), the sharing rule is determined to solve

$$\text{Max}_{y_{ij} \geq 0} W_i = \left( \frac{-1}{a_i} \right) \cdot \sum_{j=1}^{n_i} \exp(-a_i \cdot (\log y_{ij} - x_{ij})) + \frac{n_i}{a_i} \quad \text{s.t.} \quad \sum_{j=1}^{n_i} y_{ij} = S_i. \quad (4)$$

Then the first-order condition implies

$$y_{ij} = \frac{\exp\left(\frac{a_i \cdot x_{ij}}{1 + a_i}\right)}{\lambda^{1/a_i}}$$

<sup>5</sup> For a formal definition of the degree of egalitarianism in this sense, see Ray and Ueda (1996).

where  $\lambda$  is the Lagrangean multiplier. By using  $\sum_{j=1}^{n_i} y_{ij} = S_i$  and denoting  $b_i = a_i/(1+a_i)$ , we have the following derived sharing rule;

$$y_{ij} = \frac{\exp b_i x_{ij}}{\sum_{h=1}^{n_i} \exp b_h x_{ih}} \cdot S_i. \quad (5)$$

As  $b_i$  is a strictly increasing function of  $a_i$ ,  $b_i$  is also the parameter of the degree of egalitarianism. Notice that a rise of  $b_i$ , or the degree of egalitarianism, makes the marginal reward for effort go up.

### 2-3 Equilibrium effort levels

In a Nash equilibrium, each dealer chooses effort to maximize utility, given the sharing rule of the channel and all other dealers' effort levels. As  $S_i$  is given by (1), the  $j$ th dealer belonging to the  $i$ th channel solves the maximization problem

$$\underset{x_{ij} \geq 0}{\text{Max}} u_{ij} = \log \left\{ \frac{\exp b_i x_{ij}}{\sum_{h=1}^{n_i} \exp b_h x_{ih}} \cdot \frac{\sum_{h=1}^{n_i} x_{ih}}{X} \right\} - x_{ij} \quad (6)$$

in an equilibrium. By using the first-order condition

$$b_i \cdot \left( 1 - \frac{\exp b_i x_{ij}}{\sum_{h=1}^{n_i} \exp b_h x_{ih}} \right) + \frac{X - X_i}{X \cdot X_i} = 1,$$

we can confirm that every dealer in the  $i$ th channel chooses the same effort level. Thus, the first-order condition can be written as

$$X_i = \frac{X}{1 + \left( 1 - b_i \left( 1 - \frac{1}{n_i} \right) \right) \cdot X}. \quad (7)$$



In a pure Nash equilibrium, this condition must hold in every channel. Summing up these equations, we have a necessary condition of an equilibrium

$$\sum_{i=1}^m \frac{1}{1 + \left(1 - b_i \left(1 - \frac{1}{n_i}\right)\right) \cdot X} = 1, \quad (8)$$

which gives the equilibrium total effort level. Then we can calculate each channel's equilibrium effort level by using this equation and equation (7).

#### 2-4 Comparative statics

Equations (7) and (8) imply several interesting results in comparative statics.

**Proposition 1** Denote  $X_{-i} = X - X_i$ . Then  $\frac{\partial X_i}{\partial X_{-i}} > 0$ , i.e., effort levels of channels are strategic complements of each other.<sup>6</sup>

**Proof.** Differentiate both sides of equation (7) by  $X_{-i}$ . As  $\frac{\partial X}{\partial X_{-i}} = 1 + \frac{\partial X_i}{\partial X_{-i}}$ , we have

$$\frac{\partial X_i}{\partial X_{-i}} = \frac{1}{\left(1 + \left(1 - b_i \left(1 - \frac{1}{n_i}\right)\right) X\right)^2 - 1} > 0.$$

Q.E.D.

**Proposition 2**  $\frac{\partial X}{\partial b_i} > 0$  and  $\frac{\partial X_i}{\partial b_i} > 0$ , i.e., a rise of egalitarianism in a channel raises the total effort level as well as its own effort level.

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<sup>6</sup> Ueda (1997) considers a collective rent-seeking game in which each group's sharing is derived from the associated welfare function. In his model, the effort levels of competing groups are strategic substitutes in the neighborhood of equilibrium.

**Proof.** Use equation (8) to derive

$$\frac{\partial X}{\partial b_i} \cdot \sum_{k=1}^m \frac{\left(1 - b_k \left(1 - \frac{1}{n_k}\right)\right)}{\left(1 + \left(1 - b_k \left(1 - \frac{1}{n_k}\right)\right) \cdot X\right)^2} = \frac{\left(1 - \frac{1}{n_i}\right) \cdot X}{\left(1 + \left(1 - b_i \left(1 - \frac{1}{n_i}\right)\right) \cdot X\right)^2},$$

which implies that  $X$  is strictly increasing with respect to  $b_i$ . But equation (7) implies

$$\frac{\partial X_i}{\partial b_i} = \frac{1}{\left(1 + \left(1 - b_i \left(1 - \frac{1}{n_i}\right)\right) X\right)^2} \cdot \frac{\partial X}{\partial b_i} + \frac{\left(1 - \frac{1}{n_i}\right) \cdot X^2}{\left(1 + \left(1 - b_i \left(1 - \frac{1}{n_i}\right)\right) X\right)^2},$$

and this equation proves the proposition. Q.E.D.

We can see that a rise of egalitarianism in one channel raises every channel's effort level, by using Proposition 1 and 2. Although higher egalitarianism in a channel induces higher effort from members, it also makes all rivals more aggressive. This is a typical interaction in an oligopoly with strategic complements, and it appears true that a less egalitarian channel gets an advantage by letting rivals be more accommodating. The next proposition, however, shows the contrary.

**Proposition 3**  $\frac{\partial S_i}{\partial b_i} > 0$  and  $\frac{\partial S_k}{\partial b_i} < 0$  for  $k \neq i$  i.e., a rise of egalitarianism in a channel raises its market share and reduces every other's.

**Proof.** A change of the  $k$ th channel's share by a rise of egalitarianism in the  $i$ th channel is given by

$$\frac{\partial S_k}{\partial b_i} = \frac{\partial}{\partial b_i} \frac{1}{1 + \left(1 - b_k \left(1 - \frac{1}{n_k}\right)\right) \cdot X} = \frac{-\left(1 - b_k \left(1 - \frac{1}{n_k}\right)\right)}{\left(1 + \left(1 - b_k \left(1 - \frac{1}{n_k}\right)\right) \cdot X\right)^2} \cdot \frac{\partial X}{\partial b_i} < 0,$$

where the last inequality comes from Proposition 2. Then it is a straightforward conclusion that the  $i$ th channel gets a larger share than before. Q.E.D.

Our results suggest that a channel associated with higher egalitarian culture gets an advantage in competition and attains a larger market share. In the next section, we will try to relate these results to the case of the Japanese automobile market.

### **3. Distribution channels in the Japanese automobile market: Toyota and Nissan**

#### 3-1 Division of rewards in a distribution channel: The role of sales promotion funds

In the sale of automobiles, both advertising by makers and services by dealers have externalities to enhance consumers' favorable reactions and increase the total sales of a distribution channel. A dealer's effort to increase its sales also contributes to the sales of other dealers in the same channel, but the dealer does not consider this effect unless it results in personal gain. Hence, a channel needs some device for redistribution of the rewards to induce enough efforts from its members. It is difficult, however, to make and enforce a complete contract to prescribe the rewards for dealers' efforts depending on all the factors affecting sales. In a distribution channel for automobiles, therefore, the rewards are allotted through ex post provision of rebates and sales promotion funds by the maker.<sup>7</sup> On the manner of provision, we find some difference between Toyota and Nissan. In the Toyota channel, the amount of sales promotion funds for each dealer largely depends on the effort level monitored by the local inspector. In the Nissan channel, the sales plan made by the maker plays an influential role in determining how to divide the funds.<sup>8</sup> We

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<sup>7</sup> Shimokawa (1983) reports on the Japanese automobile market that an amount equal to 5% of the sales was paid as a rebate to dealers in the latter half of the 1970s.

<sup>8</sup> In a survey made by one of the authors in 1991, dealers of Toyota's channel told him that the higher effort is rewarded by a higher amount of sales promotion funds even under bad market conditions, while Nissan's dealers said the amount of the funds depends on the sales plan of the maker as well as the effort made by the dealers.

conjecture that the difference comes from the channel cultures of Toyota and Nissan. Let us examine how the difference arises by reviewing how these channels were constructed.

### 3-2 Formation of marketing channels in the Japanese automobile industry

The history of construction of distribution channels in the Japanese automobile industry began with those established by Japan Ford (1925) and Japan GM (1927). When Nissan (1934) and Toyota (1935) started the production of cars and trucks, they found it was urgently necessary to make their own distribution channels. Toyota managed this problem by headhunting such GM dealers as Hinode Motors (currently Aichi Toyota). This artifice was helped by the enactment of the Automobile Industry Act in 1936, which aimed at exclude U.S. automobile makers from Japan's market. Also, it may have been helped by GM dealers' reliance on Shotaro Kamiya, who transferred from GM to Toyota in 1935.

When the distribution of automobiles was unified in 1942 as a part of wartime controls, Kamiya's ideas about marketing became known to dealers who had belonged to other channels than Toyota's. Since a key point in his ideas is attaching importance to the dealers, many dealers began to agree with his way of thinking. Such agreement seems to be a reason why leading dealers in Nissan's prewar channel, people like Takesaburou Kikuchi, who had been the C.E.O. of the dealers' cooperative, transferred to Toyota's channel when wartime controls ended. Toyota thus came to possess some strong dealers in its channel. Many of them had enough funds on hand to allow them to retain considerable independence.

After losing a lot of its dealers, Nissan had to reconstruct its channel. As many of the remaining dealers and newcomers did not have enough funds of their own, Nissan tried to support their growth. In several cases, however, it had to take over the outlets of slack dealers. So Nissan's distribution channel became a centralized one that included many outlets owned by the maker, while Toyota's became a decentralized one consisting of independent local companies. Even in the mid-1980s, most dealers in Toyota's distribution channel were local companies, whereas Nissan had more than half of a share in 90 dealers of its channel which contains about 260 dealers. This difference essentially remained until the 1990s.

The above structural difference between the two channels effects a difference in their culture. A centralized channel like that of Nissan, where the maker often provides financial support for the dealers, produces a culture that does not attach importance to each individual dealer. On the other hand, a Toyota-

type channel, containing self-reliant dealers with their own funds, must be sensitive to the interests of individual dealers in order to keep them within the channel. This generates an egalitarian culture concerning itself with each dealer's welfare.

### 3-3 Market shares of Toyota and Nissan

The difference in sharing rules discussed in the previous section is expected to make a difference in the market share of the two distribution channels. Actually, Table 1 shows that Toyota has attained a larger market share than that of Nissan through the past 30 year<sup>9</sup>, which suggests that this phenomenon is caused by long-term factors.<sup>10</sup> The difference could be partially explained by the differences in scale between the two channels, i.e., the numbers of dealers, sales stores, and workers within the channel. Table 2 shows us that Toyota dominated Nissan in all of these categories in both 1985 and 1996. But notice that the largest difference in these categories is in the number of workers, and the ratio of the number of Nissan workers to that of Toyota workers was 70.5 % (57.0) in 1985 (1996). In the same year, the ratio of Nissan's market share to Toyota's was only 62.2 % (52.1). So difference in scale would not be enough to explain the whole difference in market share. We can see that the remainder can be explained by the effort level of the dealers and their workers. Each salesman in Toyota's channel sold 43.3 (17.2) cars on average, while each Nissan salesman sold 38.8 (15.7) cars in 1985 (1996). These data can be interpreted to mean that a dealer in Toyota's channel puts out more effort than one in Nissan's channel.

As we have argued in the last subsection, Toyota's channel contains many independent dealers and seems to have a culture that treats the interest of each dealer seriously. On the other hand, Nissan's channel, in which many dealers are outlets of the manufacturer, seems to have a centralized culture that treats individual dealers lightly. We can see that these two distribution channels have different values of the parameter  $a_i$  in our model. That is, the Toyota channel has a higher value of  $a_i$  than the Nissan channel

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<sup>9</sup> In 1960, when Nissan put its Bluebird on sale, it sold more passenger cars (48,130) than Toyota did (38,922). Even in that year, however, Toyota's total sales (including business cars, therefore) was 127,153 cars, which was larger than Nissan's total sales (103,490).

<sup>10</sup> Itami (1990, Ch.5) argues that the lower share of Nissan is caused by failures in product policies. But it is difficult to explain why the failures have been repeated for such a long time.

does. So our model predicts that the dealers of Toyota's channel provide more effort and attain higher market share than Nissan's dealers do, a result that is supported by the above data.<sup>11</sup>

#### 4. Conclusions

In this paper we consider the culture of an organization as a value judgement shared by its members. Keeping distribution channels in mind, we analyze a model of competing organizations with different value judgements and show how such a difference results in different sharing rules and different performance. Comparative statics of the model provides clues to understand the performance of two distribution channels of Japan's major automobile makers, Toyota and Nissan. Toyota's distribution channel was constructed by absorbing existing dealers, and as a result, has generated an egalitarian culture to deal with its relatively independent dealers. Such a culture makes the sharing rule of the rewards more sensitive to the observed efforts of each dealer, and derives high efforts from dealers. This effect works to the channel's advantage in the competition for market share. On the other hands, containing many outlets possessed by the maker, Nissan's distribution channel generates a more "centralized" culture that treats individual dealers lightly. As our model suggests, holding other conditions constant, such a channel loses its market share in the competition with more egalitarian channels. Thus the egalitarian culture of Toyota's channel is a factor that explains why it has attained a larger market share than Nissan's channel.

In the Japanese automobile market, a consumer is inclined to repeat purchases from the same maker. This means that a larger market share actually brings higher profits in the long run, and rewards for a channel do indeed increase with its market share. Actually, Toyota's distribution channel has local inspectors who monitor the effort levels of the dealers, and their reports are reflected in the provision of sales promotion funds to each dealer. This system is a device to keep the reputation for egalitarianism in the channel, and such efforts are compensated for by the advantage of keeping a large market share.

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<sup>11</sup> Shimokawa (1990) summarizes his observation as "the channel containing more outlets owned by the maker shows poorer sales and management."

Finally, let us emphasize that our arguments assume competing organizations. As we have noted in the introduction, the main message of the paper is that the degree of egalitarianism can be an important criterion for classifying corporate cultures because it suggests good performance by an organization in competition. Many researches on corporate culture are not so careful about the strategic interaction of competing organizations and concentrate on the role of the culture inside an organization. As a profit-making organization faces such a large amount of rivalry, the desirable characters of the culture should be argued by taking that rivalry into consideration. If we want to insist that organizations should generate the most advantageous cultures for their organizations, the accounts of existing cultures should also mention how rivalry affects the growth of a particular organization. This paper is possibly a first step to future research.

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