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The Japanese Firm vs. the American Firm

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Organizational Entry Deterrence Barrier: The Japanese Firm vs. the American Firm*

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Abstract

We formulate a three-stage game in which a Japanese firm as a generalized labor-managed firm and an American firm as a profit-maximizing firm compete in the homogeneous product market. In the first stage of the game, both the firms decide whether they enter the market or not. In the second stage, they invest capital stocks. In the third stage, they play a Nash–Cournot quantity game. We show that the Japanese firm employs more capital and produces more than does the American firm. By intentionally raising its fixed cost, the Japanese firm can survive in the market even though the American firm exits. Based on the difference in firm objectives, the Japanese firm builds an organizational deterrence barrier against the American firm through its high fixed cost. We give a rationale for long-term transactions between Japanese firms.

Keywords: Generalized Labor-Managed Firm, Profit-Maximizing Firm, Organizational Entry Deterrence.
JEL Classification No: D43, F12, L13, P51.

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1. Introduction

Krugman (1990) states that the behavior of Japanese firms differs significantly from that of American firms. However, he does not explain why this so.[1] In the last few decades, some Japanese economists have addressed this problem and suggested that Japanese firms are like labor-managed firms. They argued that Japanese firms maximize their surplus per worker. Komiya (1987) points out three factors that induce the Japanese firms to behave as if they were labor-managed firms: (1) life time employment, that is, workers, once employed, rarely leave the firm for which they work; (2) the top management of large Japanese firms usually comes from the ranks of employees who have worked for the same company since they graduated from school; and (3) stockholders have limited influence on Japanese firms and usually refrain from intervening in management affairs if the firms offer them a certain minimum rate of profit. Komiya concludes that executives of the Japanese firms are more like representatives of an employee group rather than of shareholders.

This hypothesis, however, does not explain the fact that Japanese firms grow faster than American firms (see Aoki 1990). Vanek (1970) and Meade (1972) show that the labor-managed firm invests smaller capital than does the profit-maximizing firm. In this case, Komiya's view might not hold for Japanese firms.

Recently, foreign countries have been complaining that Japanese-style business practices and long-term transactions among firms prevent foreign firms from doing business in the Japanese market. Spencer and Qui (2001) investigate vertical relationships within Japanese auto corporate groups, known as *keiretsu*, and relationship-specific investments. They develop a model of procurement with relationship-specific investments by auto part suppliers. The automaker within *keiretsu* enjoys rents resulting from these investments. They explain how these relationships in *keiretsu* can create a strong impression of the "unfair" barrier to trade, even if the practices are not truly exclusive.[2] Itoh (1992) refers to transactions such as subcontracting systems as *organizational transactions*.[3] Facing these organizational transactions, firms need to make a specific and partially sunk capital investment. The Japanese

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[1] See also Dore (1973).

[2] They show that the investments raise efficiency, but they limit the range of imports to less important parts, and it is possible that no parts are imported despite lower foreign costs. Furthermore, they point out that lack of information on investment rent tied with counterintuitive responses of imports to changes in output and costs could generate groundless "unfair trade barriers".

[3] Itoh (1992) calls some aspects of long-term relationships or long-term transactions between firms in the distribution system or in the manufacturing sectors observed in Japan "organizational transactions". See Itoh (1992), p. 63–64.

firms with organizational transactions have grown faster than have American firms. By adopting a subcontracting system or particular business practices, some Japanese automobile electrical appliances companies are proud of having rapidly grown over the last few decades. Although we also pay attention to the relationships within corporate groups and relationship-specific investments as analyzed by Spencer and Qui, we explore why Japanese firms have grown faster than have the American from an organization objective point of view. We shed light on the rationality of these business practices and on long-term transactions based on organizational objectives.

In this paper, we assume that the Japanese firms try to maximize surplus per worker consisting of wage payments and workers' share of the profit while the goal of the American firms is to maximize their profits. The framework of the paper follows the three-stage game model by Futagami and Okamura (1996). They investigate the strategic investment game model between the labor-managed firm and the profit-maximizing firm á la Brander and Spencer (1983a, b).[4] In the first stage, both the firms decide whether to enter the market or not. In the second stage, they use investments as strategic variables and commit to investment levels. In the third stage, they play a Nash–Cournot quantity game in a product market. The reaction function of the labor-managed firm can run upwardly.[5] The Japanese firm in this paper inherits this character. Therefore, the strategic effect of the Japanese firm works contrary to that of the American firm. If the Japanese firm raises its level of capital stock, the American firm reacts to reduce its output level in the third stage. Conversely, if the American firm raises its level of capital stock, the Japanese firm increases its output level in the third stage. The Japanese firm can deprive the American firm its market share by raising its level of capital stock. The American firm confronts a strategic substitute while the Japanese firm faces a strategic complement.[6]

We establish that the capital–labor ratio of the Japanese firm is higher than that of the American firm. We also show that the Japanese firm installs more capital than does the profit-maximizing American firm and can survive in the market even though the American firm cannot earn a positive profit. Consequently, this paper explains why the Japanese firm as a generalized labor-managed firm holds more capital than does the American. This paper provides another reason why the US government and executives of the American firms complain that the

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[4] Neary and Ulph (1993) examine a similar game model.

[5] See Vanek (1970), Miyamoto (1982), and Okamura and Futagami (1996).

Japanese market is closed to American firms and of unfair behavior by Japanese firms. They insist that the American firms face great difficulties in penetrating the Japanese market. It is often claimed that the particular organizational form of the Japanese firms or regulation by the Japanese government prevents the American firms from entering the market. Stewart (1991) and Zhang (1993) investigate the strategic entry deterrence problem (see Dixit 1979, 1980) and show that the labor-managed firm could have an extreme excess capacity to deter the entry of the profit-maximizing firm. This paper proposes another barrier to deter entry, the *organizational entry deterrence barrier*. We show that the Japanese firms survive more easily than the American firms in long-run equilibrium. The Japanese firms can make a positive profit when the American firm makes a loss. This robustness of labor-managed firms has already been pointed out by Neary and Ulph (1993). They use a similar setting to our model but assume a duopoly under product differentiation. We formulate a simpler model, that is, the firms produce the homogeneous goods, and prove the same result as Neary and Ulph (1993) in duopoly between the Japanese firm and the American firm.

The organization of this paper is as follows. Section 2 constructs the model. Section 3 derives the subgame perfect Nash equilibrium of the three-stage game. Section 4 compares the behavior of the Japanese firm with that of the American firm. Section 5 examines the effect of the fixed cost on the decision of both the firms about entering the market, and we derive the welfare implication of the *organizational entry deterrence barrier* by using a numerical example. Section 6 states some concluding remarks.

2. The model

We formulate a model with strategic investment as a three-stage game model. Dixit (1979, 1980) first establishes this type of the model. Brander and Spencer (1983a, b) use Dixit's method and examine the effects of strategic R&D (investment) on industry output and welfare. At the first stage, both the Japanese firm (J-firm) and the American firm (A-firm) decide whether to enter the market or not and if a firm enters, it incurs a fixed entry cost F. If both the firms enter, they choose investment levels in the second stage. In the third stage, the firms play the Nash–Cournot quantity game in a product market, taking the investment levels in the second stage as given. The J-firm and the A-firm supply a homogeneous good in the market. We denote these two firms by using superscripts J and A. Let $p=p(x^J+x^A)$ be an inverse market demand

[6] See Bulow et al. (1985) p. 502.

function where x^J and x^A are output levels of the J-firm and the A-firm, respectively. We assume that this demand function is downward sloping, that is $p' < 0$. We also assume the demand function satisfies the following condition:

$$p''x^A + p' < 0. \tag{1}$$

This condition means that the marginal revenue of the A-firm decreases as the J-firm's output increases. This condition, which ensures that the reaction function of the A-firm is downward sloping, holds unless the demand function is too convex.

Both the firms have the same production function $f(k, n)$ where $k(n)$ denotes the level of capital stock (labor). We assume that this production function exhibits constant returns to scale with diminishing marginal returns with respect to each factor, using subscripts to denote partial derivatives, that is, $f_k > 0$, $f_n > 0$, $f_{kk} < 0$, $f_{nn} < 0$, $f_{kn} > 0$. We analyze the model by introducing a labor requirement function, $n=\varphi(x; k)$, instead of the production function. Given the production function, we can represent the level of labor as a function of the levels of output and capital stock. We calculate partial derivatives as for the labor requirement function,

$$\varphi_x > 0,\ \varphi_k < 0,\ \varphi_{xx} > 0,\ \varphi_{kk} > 0, \text{ and } \varphi_{xk} < 0. \tag{2}$$

The objective of the A-firm is to maximize its own profit:

$$\max \pi = p(x^J + x^A)x^A - w^A n^A - v^A k^A - F, \quad \text{s.t. } n^A=\varphi(x^A;k^A) \tag{3}$$

where w^A and v^A show a wage rate and a rental rate of capital for the A-firm. On the other hand, the J-firm is assumed to maximize an income per worker consisting of wage payment and share of profit that goes to the workers:

$$\max V = \frac{w^J n^J + \beta[p(x^J + x^A)x^J - w^J n^J - v^J k^J - F]}{n^J}, \quad \text{s.t. } n^J=\varphi(x^J;k^J) \tag{4}$$

where w^J and v^J denote corresponding terms for the J-firm, and $1-\beta$ is the ratio of profit paid out as dividends (dividend ratio) and $0 < \beta \leq 1$. The J-firm takes β as a constant parameter. Therefore, if $\beta=1$, the J-firm coincides with the labor-managed firm. The large value of β means the weak power of stockholders of the J-firm.

3. The subgame perfect Nash equilibrium

In this section, we derive the subgame perfect Nash equilibrium of this game. First, we seek the third-stage Nash–Cournot equilibrium with the levels of capital stock k^J and k^A already determined. The equilibrium occurs when each firm maximizes its objective with respect to its own output level, equivalently, levels of labor input given the output level of its rival. This equilibrium satisfies the first-order conditions:

$$\text{J-firm: } \frac{\partial V}{\partial x^J} = H(x^J, x^A; k^J) \equiv (p'x^J + p)\phi^J - (px^J - v^J k^J - F)\phi_x^J = 0, \phi^J \equiv \phi(x^J; k^J), \tag{5}$$

$$\text{A-firm: } \frac{\partial \pi}{\partial x^A} = G(x^A, x^J; k^A) \equiv p'x^A + p - w^A \phi_x^A = 0, \phi^A \equiv \phi(x^A; k^A), \tag{6}$$

and the second-order conditions:

J-firm: $H_1(x^J,\ x^A;\ k^J) \equiv [p''x^J + 2p']\phi^J - [px^J - v^J k^J - F]\phi_{xx}^J < 0,$

A-firm: $G_1(x^A,\ x^A;\ k^A) \equiv p''x^A + 2p' - w^A \phi_{xx}^A < 0,$

where $H_1 = \dfrac{\partial H}{\partial x^J}$ and $G_1 = \dfrac{\partial G}{\partial x^A}$. The subscripts stand for the partial derivative with the corresponding arguments. Equations (5) and (6) define the reaction functions of both the firms as follows; $x^J = R^J(x^A; k^J)$, $x^A = R^A(x^J; k^A)$, given the capital stocks, k^A and k^J. If we examine slopes of the reaction functions, for the reaction function of the J-firm, we obtain

$$\frac{\partial R^J}{\partial x^A} = -\frac{H_2}{H_1},$$

where $H_2 = p''x^J \phi^J + p'(\phi^J - \phi_x^J x^J)$. Because we show $\phi_{xx}^J > 0,\ \phi^J - \phi_x^J x^J < 0,$ if the demand function is concave or not too convex, H_2 becomes positive and the reaction function of the J-firm runs upwardly. We assume $\dfrac{\partial R^J}{\partial x^A} > 0$ hereafter. As for the A-firm, we obtain

$$\frac{\partial R^A}{\partial x^J} = -\frac{G_2}{G_1},$$

where $G_2 = p''x^A + p'$. Condition (1) implies $G_2 < 0$, and the reaction function of the A-firm runs downwardly.

A change of capital stock of each firm shifts its own reaction function. By differentiating the reaction functions, we have

$$\frac{\partial R^J}{\partial k^J} = -\frac{H_3}{H_1}, \quad \frac{\partial R^A}{\partial k^A} = -\frac{G_3}{G_1} > 0,$$

where $H_3 \equiv (p'x^J + p)\phi_k^J + v^J \phi_x^J - (px^J - v^J k^J - F)\phi_{xk}^J$ and $G_3 = -w^A \phi_{xk}^A > 0$. To determine the sign of H_3, we need the following lemma.

Lemma 1

If the elasticity of substitution of the production function is not larger than one, then H_3 takes a positive value.

Proof. See Futagami and Okamura (1996).

We assume that the elasticity of substitution of the production function is not larger than one. Figures 1 and 2 depict how each reaction function shifts rightward if its own capital stock increases.

An intersection of the reaction functions, $x^J = R^J(x^A;\ k^J)$ and $x^A = R^A(x^J;\ k^A)$, gives the third-stage Nash equilibrium as follows:

$$x^J = g^J(k^J;\quad k^A),$$
$$x^A = g^A(k^A;\quad k^J).$$

The third-stage Nash equilibrium depends on the levels of capital stock that the two firms choose in the second stage. We examine how the levels of capital stock change the third-stage Nash equilibrium outputs. By totally differentiating (5) and (6), we have

$$dx^J = \frac{1}{\Delta}(-G_1 H_3 dk^J + H_2 G_3 dk^A), \tag{7}$$

$$dx^A = \frac{1}{\Delta}(-G_2 H_3 dk^J + H_1 G_3 dk^A), \tag{8}$$

where $\Delta \equiv H_1 G_1 - H_2 G_2 > 0$. Consequently, we obtain the following lemma.

Lemma 2

An increase of the capital stock of the J-firm raises its own output, while it reduces the output of the A-firm of the third-stage Nash equilibrium. On the other hand, an increase of the capital stock of the A-firm raises both the output levels of the third-stage Nash equilibrium, that is,

$$\frac{\partial x^J}{\partial k^J} > 0, \ \frac{\partial x^A}{\partial k^J} < 0, \ \frac{\partial x^J}{\partial k^A} > 0, \ \frac{\partial x^A}{\partial k^A} > 0.$$

Because an increase in k^J shifts the reaction function of the J-firm outward, the third-stage Nash equilibrium moves from E_1 to E_2 (see Figure 1). On the other hand, an increase in k^A also pushes the reaction of the A-firm outward, hence, the third-stage Nash equilibrium moves from E_3 to E_4 (see Figure 2).

Next, we consider the second stage of the game. The two firms choose levels of capital stock taking account of the third-stage Nash equilibrium. The necessary conditions are given by

$$\frac{dV}{dk^J} = \left(p' x^J \frac{\partial x^A}{\partial k^J} - v^J \right)\phi^J - \left(px^J - v^J k^J - F \right)\phi_k^J = 0, \tag{9}$$

$$\frac{d\pi}{dk^A} = p' x^A \frac{\partial x^J}{\partial k^A} - w^A \phi_k^A - v^A = 0. \tag{10}$$

We assume that the second-order conditions of these maximization problems are satisfied. Equations (5), (6), (9), and (10) determine the full equilibrium values of k^J, k^A, x^J, and x^A. The equilibrium levels of labor, n^J and n^A are derived from the labor requirement functions.

4. Which firm invests and produces more?

In this section we examine whether the A-firm or the J-firm invests and produces more. We consider the following benchmark case:

$$w^J + \frac{\beta[px^J - w^J n^J - v^J k^J - F]}{n^J} = w^A. \tag{11}$$

This relationship means that workers hired by the J-firm receive the same income as the A-firm's workers. When the J-firm and the A-firm employ their workers in the same labor market, competitive pressure forces both the firms to pay the same wages to their workers. Furthermore, $v^J = v^A \equiv v$ holds under a perfect competitive capital market.

We can state the following proposition.

Proposition 1

If the J-firm makes a positive profit, then the J-firm adopts higher capital intensity technology than does the A-firm in the benchmark case, that is, $\frac{k^J}{n^J} > \frac{k^A}{n^A}$.

Proof. From the first-order conditions, (9) and (10), we obtain

$$-\frac{1}{\phi_k^J} = \frac{\left(px^J - vk^J - F\right)(\phi^J)^{-1}}{\left(v - p'x^J \frac{\partial x^A}{\partial k^J}\right)},$$

$$-\frac{1}{\phi_k^A} = \frac{w^A}{\left(v - p'x^A \frac{\partial x^J}{\partial k^A}\right)}.$$

From lemma 2, the denominator of $-1/\varphi_k^J$ is smaller than that of $-1/\varphi_k^A$. From the benchmark condition (11), we have

$$\left(px^J - vk^J - F\right) - w^A n^J = (1-\beta)\left\{px^J - w^J n^J - vk^J - F\right\} = \frac{1-\beta}{\beta}\left(w^A - w^J\right)n^J > 0.$$

As the J-firm makes a positive profit, $w^J < w^A$ holds. The numerator of $-1/\varphi_k^J$ is larger than that of $-1/\varphi_k^A$. We then show that $-1/\varphi_k^J > -1/\varphi_k^A$. As $-1/\varphi_k^i = f_n^i / f_k^i$ (i=J, A) and they increase with capital labor ratio k/n, we reach the desired result. Q.E.D.

From the above proposition, we can also prove that

$$\frac{f_n^J}{f_k^J} > \frac{w^A}{v} > \frac{f_n^A}{f_k^A}.$$

This inequality leads to the following corollary of proposition 1, as $f_n^J/f_k^J > w^J/v$ holds if the J-firm earns a positive profit.

Corollary 1

If the J-firm earns a positive profit, then the J-firm uses more capital-intensive technology, while the A-firm adopts more labor-intensive technology compared with the cost-minimizing technology.

Miyazaki (1984) establishes that the labor-managed firm prefers a higher capital–labor ratio to the profit-maximizing firm. We have confirmed his result in this game theoretical framework. We proceed to prove that the J-firm can employ more capital and produce more than does the A-firm.

Proposition 2

If the J-firm makes a positive profit and β is close to one, then the J-firm employs more capital and produces more than does the A-firm.

Proof. Because $\frac{\partial f_n}{\partial (k/n)} = -\frac{kf_{kk}}{n} > 0$, proposition 1 indicates $f_n^A < f_n^J$, that is $\varphi_x^A > \varphi_x^J$. From (5) and equality (11), we get

$$\left(p'x^J + p\right) = \left(\frac{1}{\beta}w^A - \frac{1-\beta}{\beta}w^J\right)\phi_x^J.$$

By using (6), we can rearrange the above expression as follows:

$$\beta\left(p'x^J + p\right) + (1-\beta)w^J\phi_x^J = \left(p'x^A + p\right)\frac{\phi_x^J}{\phi_x^A}.$$

Summarizing the above argument, when β=1 (the J-firm completely coincides to the labor-managed firm), then $p'x^J + p < p'x^A + p$. That is, we have $x^J > x^A$. If β is close to one, we can have the same inequality. Suppose that the contrary, $k^A \geq k^J$, holds. From proposition 1, $n^A > n^J$, hence, $x^A > x^J$. This relation contradicts $x^J > x^A$. Then, $k^A \geq k^J$ must hold. Q.E.D.

We have shown that the J-firm can have more capital than does the A-firm if the J-firm behaves as the generalized labor-managed firm. The intuition behind proposition 2 is that the marginal revenue of the J-firm increases with the strategic term, $p' x^J \dfrac{\partial x^A}{\partial k^J} > 0$. On the contrary, the marginal revenue of the A-firm decreases with the strategic term $p' x^A \dfrac{\partial x^J}{\partial k^A} < 0$.

5. Organizational entry deterrence

We consider the situation in which entry cost increases so that it becomes more difficult for each firm to enter the market, because the increase harms the firms' profits. If a firm cannot earn positive profits, the firm that makes a loss exits the market. We address which firm is more robust against the increase in entry cost. By using proposition 2, we can show the following proposition.

Proposition 3

Suppose β is close to one. Even if the profit of the A-firm is zero, the J-firm can make a positive profit in the benchmark case.

Proof. At the second-stage subgame perfect Nash equilibrium,

$$w^J + \beta \max_{x^J, k^J} \frac{\left[p\left(x^{A*} + x^J\right)x^J - w^J \varphi\left(x^J; k^J\right) - vk^J - F \right]}{\phi\left(x^J; k^J\right)} = w^A \quad ,$$

where x^{A*} denotes the output of the A-firm supplied optimally and x^{J*} shows the optimal choice by the J-firm. Therefore, we obtain

$$w^J + \beta \frac{\left[p\left(x^{A*} + x\right)x - w^J \varphi(x;k) - vk - F \right]}{\phi(x;k)} \leq w^A \; for all x,k.$$

Because $x^{A*} < x^{J*}$,

$$w^J + \beta \frac{\left[p\left(x^{J*} + x\right)x - w^J \varphi(x;k) - vk - F\right]}{\phi(x;k)} < w^A \, for all x,k.$$

By rearranging this, we obtain

$$\beta\left[p\left(x + x^{J*}\right)x - w^A n - vk - F\right] + (1-\beta)\left(w^J - w^A\right)n < 0 \, for all x, k.$$

When the A-firm makes zero profit, $w^J < w^A$ must hold; hence, the J-firm earns a positive profit because of (11). Q.E.D.

To examine how the level of the fixed cost affects the profits of both the firms, we specify the demand and the production function by

$$p(x^J + x^A) = a - x^J - x^A,$$

$$f(k,n) = \sqrt{kn}\ .$$

The labor requirement function derives from

$$\phi(x;k) = \frac{x^2}{k}$$

After some manipulations, we obtain four equations that define the perfect Nash equilibrium.

$$a(x^A + x^J - a)\{(x^J)^2 - F\} + x^A (x^J)^2 (a - 2x^J - x^A) = 0,$$

$$a(x^A + x^J - a)(a - 2x^A - x^J)^2 + 4wv(a^2 - ax^A - ax^J + 2x^J x^A) = 0,$$

$$k^J = \frac{1}{2v}\{(a - x^A)x^J - 2F\},$$

$$k^A = \frac{2wx^A}{a - 2x^A - x^J},$$

$$0 < x^A + x^J < a.$$

Suppose that a=11, v=1, and w=1. By numerical calculations, we depict Figure 3, which describes the relationship between the fixed cost F and each firm's profit.[7] The curves labeled π_a and π_j are the profits of the A-firm and the J-firm, respectively, while that of π_{mj} shows the profit of the J-firm when it is a monopolist. This figure implies that both the profits (π_a and π_j) decrease as fixed cost increases. For the small amount of the fixed cost, $F \in (0, F_N)$, the A-firm's profit exceeds that of the J-firm and *vice versa*. The profit of the A-firm is decreasing more rapidly than the J-firm's. When the A-firm cannot earn a positive profit at F_{Min} and exits the market, the J-firm makes a positive profit. If the fixed cost is smaller than F_{Min}, both the A-firm and the J-firm can coexist in the market. Otherwise, only the J-firm can operate and the resulting market structure becomes a monopoly of the J-firm. The difference in organizational form of each firm generates this market structure. By taking advantage of the difference, the Japanese government can prevent the A-firm from penetrating its domestic market. Suppose that the fixed cost is small, that is, $F < F_{Min}$ initially, and the A-firm can supply its product in the Japanese market. Consider that the Japanese government imposes a franchise fee on both the firms and the total fixed cost exceeds F_{Min}.[8] The A-firm is forced to exit the market, while the J-firm can survive. The Japanese government can deter the entry of the A-firm by setting the fee as high as possible to protect the J-firm.

We can also imagine the following situation. The A-firm that has decided to enter the Japanese market does not have the expertise to transact within Japanese-style business practices and to keep long-term transactions within the wholesale network. The firm must then form its own distribution or sales system to supply its products. To establish this system in Japan, the A-firm has to incur a high cost, which is the fixed entry cost. It is difficult for the A-firm to earn a positive profit when paying this entry cost. This high fixed cost of constructing its own distribution or sales system, combined with the particular organizational form of the J-firm, can work as an entry deterrence barrier against the A-firm. The organizational structure of the J-firm results in an entry barrier against the A-firm. The high fixed cost generates an *organizational entry deterrence barrier* against the profit-maximizing firm.

Next we discuss the effect of this organizational entry deterrence barrier on social welfare.

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[7] We also calculate the profits of the J-firm and the A-firm, supposing that these parameters take other values (a=9 and 15, v= 0.5 and 1.5, and w=0.5 and 1.5). In the cases of other parameter values, the qualitative relationship between the profit and the fixed cost is invariant.

[8] For example, if a new entrant intends to enter a market of the industry under regulation of the Japanese government, then it has to have the authorization to enter the market, without regard to a Japanese firm or an American. It takes much time and

We adopt the consumer surplus and the profits of both the A-firm and the J-firm to evaluate the social welfare. We calculate these surpluses in the case that a=11, v=1, and w=1.[9] Figure 4 depicts the relationships between these surpluses and the level of the fixed cost in this case. The dotted curve labeled W-Surplus shows the sum of the consumer surplus and the profits of the J-firm and the A-firm, that is, the total surplus of this world. This curve is declining monotonously. The curve of J-Surplus shows the sum of the consumer surplus and the profit of only the J-firm, that is, the total surplus of Japan. The J-Surplus curve has a peak before it intersects the W-surplus curve. The total surplus when only the J-firm survives and operates in this market is shown by the curve named JM-Surplus. This curve has a peak like the J-Surplus curve. The profits of both the firms are calculated by subtracting the fixed cost, so the surplus is the net one. F_{Min} is the level of the fixed cost at which the curve of W-Surplus intersects that of J-Surplus. Below that level of the fixed cost, the A-firm makes a loss and exits the market.

Figure 4 suggests the following welfare implication. When the Japanese firm raises the fixed cost over F_{Min} by making the relationship-specific investment, it can eject the A-firm from the Japanese market. Only the J-firm can operate in the market, but total output is smaller than when both the firms coexist and produce. Consumer surplus declines because of the smaller output while the profit of the J-firm increases as compared with the case when both the firms operate. The decrease of consumer surplus exceeds the increased profit of the J-firm. The total surplus becomes smaller than that when both the A-firm and the J-firm operate in the market. By using the entry deterrence barrier with the high fixed cost and the organizational difference between the J-firm and the A-firm, the Japanese firm succeeds in protecting itself but it entails welfare losses for consumers in Japan.

6. Conclusion

In this paper we examine a duopoly with a Japanese firm (J-firm), which behaves like a generalized labor-managed firm, and an American firm (A-firm), which maximizes its profit competing in the homogeneous product market. We prove that the J-firm employs more capital and produces more than the A-firm does. This result is consistent with the empirical results of Dertouzos et al (1989). They find that the ratio of R&D investment of Japanese firms outnumbers that of American firms. The structure of this paper provides an explanation of their

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trouble to get permission from the authority. That may cost too much for the entrant.

[9] We also calculate the cases of the other parameter values of a (a=9 and 15 with w=1 and v=1) and v (v=0.5

findings.

This paper also explains the role that organizational transactions (Japanese-style business practices and long-term transactions) play as nontariff entry barriers. This explanation differs from that of Spencer and Qui (2001). *When Japanese firms behave like generalized labor-managed firms, it is rational for many Japanese firms to engage in Japanese-style business practices and to establish long-term transactions, even if that requires particular investments*. Consequently, the organizational transactions among the Japanese firms function as strategic nontariff entry barriers.

We examine the effects of the higher fixed cost on the welfare of the economy by using a numerical example. The Japanese firm raises its fixed cost by some means and can prevent the A-firm from doing business in the domestic market. But this is realized at the expense of consumers in Japan because of the smaller output. The detailed impact of this organizational structure on the welfare of the economy should be examined in future research.

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and 1.5 with a=11 and w=1), and obtain the same qualitative results.

References

Aoki, M. (1990) "Towards an Economic Model of Japanese Firm," *Journal of Economic Literature*, 28, 1–27.

Brander, J. and B. Spencer (1983a) "Strategic Commitment with R&D: The Symmetric Case," *Bell Journal of Economics*, 14, 225–235.

Brander, J. and B. Spencer (1983b) "International R&D Rivalry and Industrial Strategy," *Review of Economic Studies*, 50, 707–722.

Bulow, J., J. Geanakopolos, and P. Klemperer (1985) "Multimarket Oligopoly: Strategic Substitutes and Complements, *Journal of Political Economy*, 93, 488–511.

Dertouzos, M., L. Lester, R. Solow, and the MIT Commission on Industrial Productivity (1989) *Made in America*: *Regaining the Productive Edge*, Cambridge: MIT Press.

Dixit, A. (1979) "A Model of Duopoly Suggesting a Theory of Entry Barriers," *Bell Journal of Economics*, 10, 20–32.

Dixit, A. (1980) "The Role of Investment in Entry-Deterrence," *The Economic Journal*, 90, 95–106.

Dore, R. (1973) *British Factory, Japanese Factory*: *The Origins of National Diversity in Industrial Relations*, Berkeley: University of California Press.

Futagami, K. and M. Okamura (1996) "Strategic Investment: The Labor-Managed Firm and the Profit-Maximizing Firm," *Journal of Comparative Economics*, 23, 73–91.

Itoh, M (1992) "Organizational Transactions and Access to the Japanese Import Market" in Paul Sheard (ed.) *International Adjustment and the Japanese Firm*, Sydney: Allen & Unwin, 50–71.

Komiya, R. (1987) "Japanese firms, Chinese firms: problems for Economic Reform in China. Part I," *Journal of the Japanese and International Economies*, 1, 31–61.

Krugman, P. (1990) *The Age of Diminished Expectations*: *US Economic Policy in the 1990s*, Washington DC: The Washington Post Company.

Meade, J. (1972) "The Theory of Labour-Managed Firms and Profit Sharing," *The Economic Journal*, 82, 402–428.

Miyamoto, Y. (1982) "A Labor-Managed Firm's Reaction Function Reconsidered," mimeo Osaka City University.

Miyazaki, H. (1984) "Internal Bargaining, Labor Contracts, and a Marshallian Theory of the Firm," *American Economic Review*, 74, 381–393.

Neary, H. and D. Ulph (1993) "Strategic Investment and the Co-existence of Labour-Managed and Profit-Maximizing Firms," mimeo, University of British Columbia.

Spencer, B. J. and L. Qui (2001) "Keiretsu and Relational-specific Investment: A Barrier to Trade?" *International Economic Review*, 42, 871–901.

Stewart, G. (1991) "Strategic Entry Interactions Involving Profit-Maximizing and Labor-Managed Firms," *Oxford Economic Papers*, 43, 570–583.

Vanek, J. (1970) *The General Theory of Labor-Managed Market Economies*, Ithaca: Cornell University Press.

Zhang, J. (1993) "Holding Excess Capacity to Deter Entry in a Labour-Managed Industry," *Canadian Journal of Economics*, 26(1), 222–234.

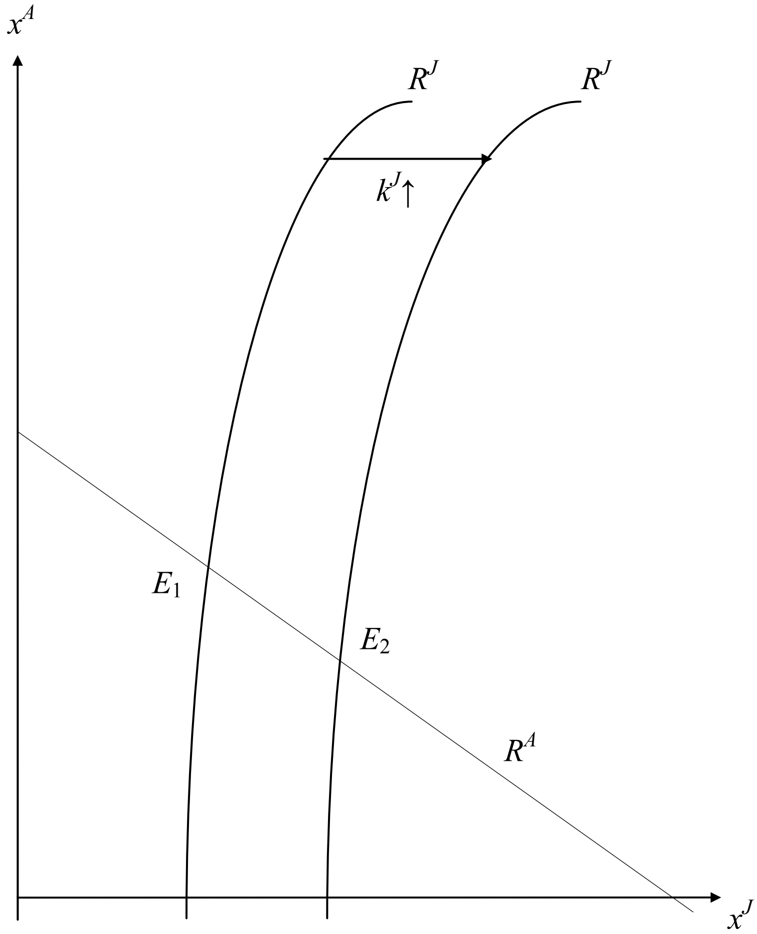

Figure 1

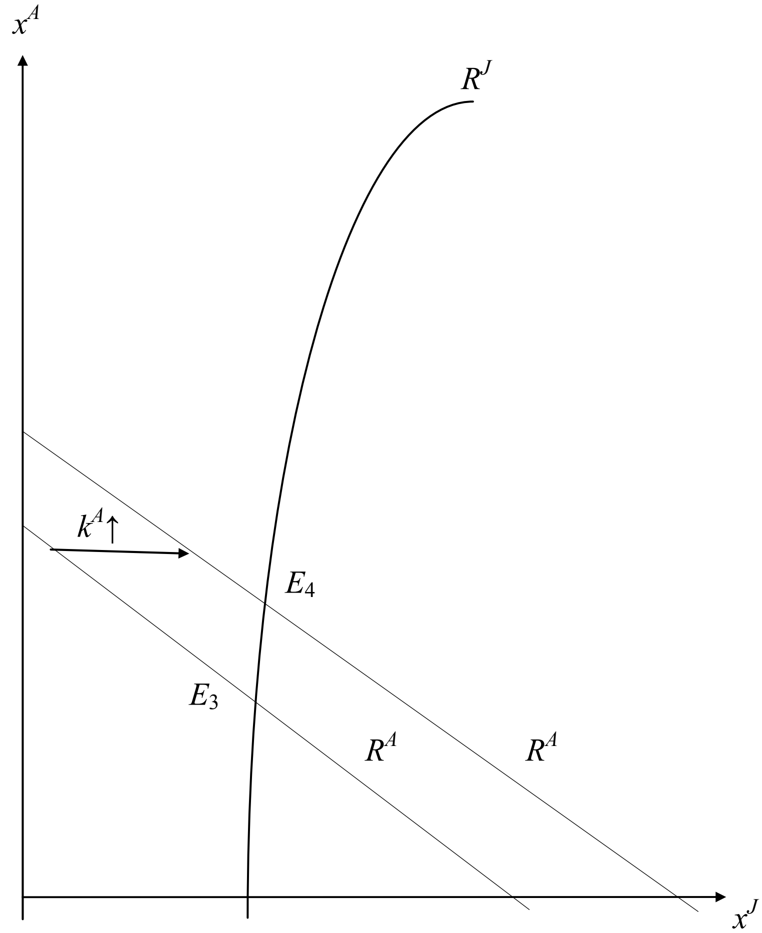

Figure 2