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Discussion Papers in Economics

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Unionized labor market and divisionalization[*]

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Abstract: We show the incentive for divisionalization by a monopolist producer. In contrast to the previous literature, where divisionalization occurs for product market advantage, we show that divisionalization occurs if it provides strategic advantage in the labor market. With unionized labor market, we show that divisionalization by a monopolist is profitable under both uniform and discriminatory wage setting by the union. However, the incentive for divisionalization is higher under the former situation. We consider divisionalization under both quantity and price competition, and the incentive for divisionalization is found to be higher under price competition.

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Unionized labor market and divisionalization

1. Introduction

Textbook view suggests that entry of a firm reduces industry profit, while the empirical evidences show that often firms create independently managed rival firms supplying similar products and competing in the same market (see Yuan, 1999, for the evidences). Earlier works show that these two facts are consistent if there is business-stealing effect of divisionalization. Though, creation of an independent division increases competition and reduces industry profit, it can increase total profit of the firm creating this new division by extracting market share and profit from its competitors. In earlier works, Schwartz and Thompson (1986) and Veendorp (1991) show that the entry deterrence may be the rationale for divisionalization. In a two-stage game, Corchon (1991), Polasky (1992), Baye et al. (1996) and Corchon and Gonzales-Maestre (2000) analyze whether divisionalization is an equilibrium phenomenon in the duopoly market with homogeneous products, and Yuan (1999) extend this existence problem in an oligopoly with differentiated products.

The main rationale for divisionalization in the above-mentioned papers is its business-staling effect in the product market. Hence, divisionalization occurs *provided it gives the firm strategic advantage in the product market, and a monopoly firm does not have the incentive for divisionalization*.

In this paper, we provide a new rationale for divisionalization. With a monopolist producer, which helps us to eliminate the strategic effect in the product market, we show that divisionalization is profitable if the labor market is unionized. So, even if divisionalization gives no strategic advantage in the product market, it may give a strategic advantage in the labor market. It may worth noting that, though we consider labor union as the upstream agent, our analysis is also applicable if the

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upstream agent is a profit-maximizing firm who is selling an intermediate input to the final goods producer(s) and charging linear price.

In what follows, section 2 analyzes the case of a monopolist producer without divisionalization. Then, in section 3, we consider profitability of divisionalization by the monopolist when the product market (under divisionalization) is characterized by quantity competition. Even if divisionalization creates competition in the product market, it helps to reduce wage rate charged by the labor union. However, the monopolist can reduce the competition effect by designing a suitable licensing contract, consisting of an up-front fixed-fee and per-unit output royalty, thus benefiting from lower wage rate due to divisionalization. Appealing to the empirical evidences of Haucap et al. (2000 and 2001) (more in section 3.1), we consider uniform wage setting by the labor union in section 3.1. Under uniform wage setting, divisionalization reduces wage rate for both the divisions, and makes divisionalization profitable.

However, the incentive for divisionalization is not dependent on the assumption of uniform wage rate, and we show this in section 3.2 with wage discrimination. Under wage discrimination, wage rate for the monopolist's existing division is unaffected due to divisionalization, but the wage rate for the new division is lower than the monopolist's existing division. Though, lower wage rate for the new division makes divisionalization profitable even under wage discrimination, wage reduction in the monopolist's existing division under uniform wage makes divisionalization more beneficial under uniform wage than wage discrimination.

In section 4, we show that the incentive for divisionalization is also not dependent on the assumption of quantity competition in the product market, and it can occur even under price competition. Here, we consider the uniform wage setting

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model of section 3.1 but with price competition under divisionalization, and show that divisionalization is a profitable strategy of the monopolist. We further show that profit of the monopolist is higher under price competition than quantity competition, and therefore, the incentive for divisionalization may be higher in market with more intense competition.

Besides the literature on divisionalization, the present paper can also be related to Wang and Yang (1999), Faulí-Oller and Sandonis (2002), Wang (2002) and Mukherjee and Pennings (2005), which show the incentive for licensing by a monopolist producer. While Mukherjee and Pennings (2005) shows strategic trade policy as the reason for licensing, other papers show product differentiation as the motivation for licensing.[1] In contrast, in a closed economy, this paper shows that advantage in the labor market only may explain the reason for divisionalization.

In a recent paper, Naylor (2002) shows the (industry) profit raising effect of *exogenous* entry. Our analysis differs from Naylor (2002) is some important ways. First, we differ from Naylor (2002) with respect to the institutional setup. He considers firm-specific labor union that sets the wage rate to maximizes its own utility, while we have an industry-wide (or national) labor union (such as Zhao, 1995 and 1998, and Haucap et al., 2000 and 2001, to name a few) that sets the wage rate to maximize its utility from the industry-wide labor supply.[2] So, in Naylor (2002), entry of a firm also increases the number of labor unions, and it is not clear whether his result is due to the entry of a producer only or due to the entry of both producer and labor union, whereas the number of labor union remains the same in our analysis. We show that for the

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[1] Similar reason follows also from Mukherjee and Balasubramanian (2001).
[2] Unionization structure differs significantly between countries. While decentralized wage setting may be relevant, e.g., in Japan and North America, centralized wage setting is relevant, e.g., in Germany and Scandinavia. For cross-country comparison on labor markets, one may refer to Nickell (1997), Blau and Kahn (1999) and Wallerstein (1999). We will discuss more in section 3.1 about the wage setting behavior of the labor union.

comparable discriminatory wage setting of Naylor (2002) but with a single labor union, exogenous entry of a firm does not increase the industry profit in our analysis. Thus, e*ndogenous* entry in our paper, which helps to manipulate the wage rate through the licensing contract, creates another important difference from Naylor (2002). Finally, unlike him, we consider both price and quantity competition and show the incentive for divisionalization under different types of product market competition.[3]

We conclude the paper in section 5.

2. Monopoly

Let us consider the market for a single product with a monopolist producer, called incumbent. Assume that production requires only labor and, for simplicity, we assume that one labor is used to produce one unit of output, and there is no fixed cost of production. However, the wage rate for labor is determined by an industry-wide monopolist labor union. To show the incentive for divisionalization by the monopolist producer in the simplest way, we consider a monopolist labor union such as Dunlop (1944) and Oswald (1982). Extending this analysis to incorporate bargaining between the firm and the union will not add new insight to our analysis. Like Nickell and Andrews (1983), Haucap et al. (2000 and 2001), Naylor (2002), López and Naylor (2004) and many others, we consider a right-to-mange model of labor union, where the labor union chooses the wage rate to maximize its utility and the firm(s) have

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[3] Tyagi (1999) shows that *exogenous* entry can increase profit of the incumbents if the initial product market is *not characterized by a monopoly and the slope of the inverse market demand function falls very rapidly*. Neither of these conditions is met in our analysis, and there is no indication in Tyagi (1999) whether industry profit increases with entry in absence of these two conditions. Though, in principle, industry profit may increase even if entry reduces profit of the incumbents, it is not the case in Tyagi (1999) when, initially, there is a monopolist final goods producer and the inverse demand curve is linear, as considered in the present paper. Again, *endogenous entry and designing a suitable licensing contract* create important difference between Tyagi (1999) and the present paper. Further, unlike Tyagi (1999), we consider both price and quantity competition, and show their impacts on the incentive for divisionalization.

right-to-manage autonomy over employment.[4] Further, for simplicity, we assume that the reservation wage rate for each labor is zero.

Assume that the inverse market demand function for the final product is

$$P = a - q, \tag{1}$$

where the notations have usual meanings.

We consider the following game. At stage 1, the union sets the wage rate. At stage 2, the incumbent chooses its output and the profits are realized. We solve the game through backward induction.

Given the wage rate w, the optimal output of the incumbent and hence, the demand for labor is

$$q_I = \frac{(a - w)}{2}. \tag{2}$$

We consider the utility of the union as $U = wq$ (see, e.g., Naylor, 2002).[5] The union chooses wage rate to maximize its utility, i.e.,

$$\underset{w}{\text{Max}} \frac{w(a - w)}{2}. \tag{3}$$

The optimal wage rate is $w^m = \dfrac{a}{2}$. Hence, total demand for labor and optimal profit of the incumbent are respectively $\dfrac{a}{4}$ and $\pi_i^m = \dfrac{a^2}{16}$. Utility of the union is $U^m = \dfrac{a^2}{8}$.

3. Divisionalization: quantity competition

Let us now examine the incentive for divisionalization by the incumbent.

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[4] The 'efficient bargaining' model, which stipulates that the firms and unions bargain over wages and employment, is an alternative to the right-to-manage model. See, Layard et al. (1991) for arguments in favor of right-to-manage model.

[5] Note that total labor supply is equal to total outputs.

3.1. Uniform wage setting

We consider the following game. At stage 1, the incumbent decides whether to open another independent division,[6] called entrant, which competes with the incumbent with a homogenous product. If the incumbent decides to open a new division, we assume that the incumbent licenses its production technology to the entrant, and charges an up-front fixed-fee, F, and per-unit output royalty, r, for its technology. Further, the incumbent has full bargaining power for the licensing contract. However, the entrant takes its output decision independently.[7] At stage 2, the union sets the uniform wage rate. At stage 3, the firms choose their outputs simultaneously, if the incumbent opens the new division at stage 1. If there is no new division at stage 1, the incumbent operates like a monopolist. We solve the game through backward induction.

It is well-known that an upstream agent will prefer price discrimination than uniform pricing if there are differences in the downstream agents (Yoshida, 2000). Hence, it is arguable that the labor union may prefer to charge different wages to different firms if the royalty rate creates marginal cost difference between the firms. However, empirical evidences suggest that in many situations a labor union charges uniform wage irrespective of the differences between the firms. As discussed in Haucap et al. (2000 and 2001), a common feature of many labor markets in the continental Europe is 'coverage extension rules', which implies that some or all employment terms are made generally binding for all industry participants and not only for the members of unions and employers' associations. "In Germany, for

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[6] In general, one may want to ask how many divisions the monopolist would like to open in presence of labor union. However, to serve the purpose of this paper, which is to show the incentive for divisionalization by a monopolist, in the simplest way, we restrict our attention to one new division. Creation of more divisions will only strengthen our result.

[7] For simplicity, we assume away the cost for opening the new division. However, it is trivial that positive cost for opening the new division will reduce the incentive for divisionalization.

example, collective wage agreements between a union and an employers' association can be made compulsory even for independent employers through so-called *Allgemeinverbindlicherklärung* (AVE) … The Ministry of Labor can, on application of either unions or employers' associations, use an AVE to make some or all terms of a collectively negotiated employment contract generally binding for an entire industry, where otherwise only those unions, employers and employers' associations that have actually negotiated and signed the contract would be directly bound by it (§3 I TVG)" (Haucap et al., 2001). It is also noted in Haucap et al. (2001) that the number of AVEs almost continuously increased from 448 in 1975 to 588 in 1998.[8] Thus, it justifies our analysis with uniform wage setting by the labor union.

If there is no new division, it is trivial that the analysis will be similar to section 2. Now, consider the game under the history of divisionalization at stage 1.

If there is a new division at stage 1, the equilibrium outputs and profits of the incumbent's division and the entrant are respectively

$$q_i^* = \frac{(a-w+r)}{3} \qquad \text{and} \qquad q_e^* = \frac{(a-w-2r)}{3} \qquad\qquad (4)$$

$$\pi_i^* = \frac{(a-w+r)^2}{9} \qquad \text{and} \qquad \pi_e^* = \frac{(a-w-2r)^2}{9}. \qquad\qquad (5)$$

It is important to note that output of the entrant is zero for $w \geq a - 2r$.

Hence, total demand for labor is

$$q_I = q_i^* + q_e^* = \frac{(2a-2w-r)}{3}, \qquad\qquad \text{for } w < a - 2r \qquad (6)$$

$$q_I = q_i^* = \frac{(a-w)}{2}, \qquad\qquad \text{for } w \geq a - 2r. \qquad (7)$$

It is clear from (7) that there is no demand for labor for $w > a$.

3.2. The wage rate and the profits

Given the demand for labor under divisionalization, it should be noted that the labor union might not charge a wage rate to accommodate both the firms. In other words, the labor union may better off by charging a wage rate so that, given that wage rate, only the incumbent produces in the market. Before going to discuss this issue, let us first consider the optimal wage rate when both firms produce in the product market.

If both firms demand labor, the union maximizes the following expression to determine the wage rate:

$$\underset{w}{\text{Max}} \, \frac{w(2a - 2w - r)}{3}. \tag{8}$$

The optimal wage rate is $w = \dfrac{2a - r}{4}$. Given the wage rate $w = \dfrac{2a - r}{4}$, the utility of the union is $U^{c,d} = \dfrac{(2a - r)^2}{24}$. It should be noted that, given r and the optimal wage rate, the entrant produces provided $r < \dfrac{2a}{7}$.

Therefore, at stage 1, the incumbent maximizes the following expression:

$$\underset{F,r}{\text{Max}} \, \frac{(2a + 5r)^2 + 12r(2a - 7r)}{144} + F \tag{9}$$

subject to

$$\frac{(2a - 7r)^2}{144} - F \geq 0. \tag{10}$$

Given that the reservation payoff of the new division is zero and the incumbent has full bargaining power, the maximum fixed-fee fee will be $F = \dfrac{(2a - 7r)^2}{144}$. With this maximum fixed-fee, the maximization problem of (9) becomes:

$$\underset{r}{\text{Max}} \, \frac{(2a + 5r)^2 + (2a - 7r)^2 + 12r(2a - 7r)}{144}. \tag{11}$$

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The maximization of (11) gives the optimal royalty rate as $r = \dfrac{4a}{5}$. However, since

$\dfrac{4a}{5} > \dfrac{2a}{7}$, the constraint for positive output of the entrant is binding and implies that

the royalty rate will not exceed $\dfrac{2a}{7}$.

It is now important to note that the maximization problem (11) has assumed

that the threat of competition in the product market is credible. But, as mentioned

already, ex-post licensing, the labor union may charge the wage rate in a way that

eliminates the credible threat of competition. If fact, given the royalty rate $\dfrac{2a}{7}$, if the

labor union charges the wage rate $\dfrac{a}{2}$, which is the optimal wage rate under monopoly,

then, at stage 3, it is optimal for the incumbent to choose its monopoly output

corresponding to the wage rate $\dfrac{a}{2}$. So, if the royalty rate is $\dfrac{2a}{7}$, it is optimal for the

union to charge $\dfrac{a}{2}$, and the optimal outputs of the incumbent and the entrant are

respectively $\dfrac{a}{4}$ and 0. Hence, this licensing contract under divisionalization does not

create a credible threat of competition, and generates market outcomes similar to

monopoly.

So, to make the threat of competition credible, the royalty rate should be such

that it induces the labor union to charge the wage rate corresponding to the duopoly

market structure, i.e., following $w = \dfrac{2a - r}{4}$, rather than choosing the wage rate $\dfrac{a}{2}$.

Therefore, the royalty rate should satisfy:

$$\frac{(2a - r)^2}{24} \geq \frac{a^2}{8}, \tag{12}$$

which gives the optimal royalty rate as $r^{c,d} = a(2 - \sqrt{3})$, and the corresponding wage

rate is $w^{c,d} = \dfrac{a\sqrt{3}}{4}$. The utility of the union is $U^{c,d} = \dfrac{a^2}{8}$. The *total* profit of the

incumbent is

$$\pi_i^{c,d} = \frac{a^2}{144}\left[(12 - 5\sqrt{3})^2 + (7\sqrt{3} - 12)^2 + 12(2 - \sqrt{3})(7\sqrt{3} - 12)\right]. \tag{13}$$

Comparison of (13) with the incumbent's profit under monopoly gives the following

result.

Proposition 1: *If the labor union charges uniform wage rate to the firms, divisionalization is a profitable strategy for the monopolist incumbent.*

The intuition for this result is easy to understand. Divisionalization creates competition in the product market, which tends to reduce profit of the incumbent for a given wage rate. However, entry of a new firm in the product market makes the demand function for labor more elastic and reduces the wage rate, thus increasing production efficiency by reducing the marginal cost of production, which has a positive impact on profit. Through its choice of output royalty, the incumbent can soften competition in the product market, while enjoying the benefit of higher production efficiency, and find it optimal to create a new division.

It should be clear from the above discussion that divisionalization increases welfare compared to monopoly. The utility of the labor union is the same under divisionalization and monopoly, but profit of the incumbent increases with divisionalization. Since divisionalization increases total output of the final goods, it also increases consumer surplus, and therefore, increases welfare, which is the sum of consumer surplus, profit of the final goods producer(s) and utility of the labor union.

3.3. Wage discrimination

Now, we relax the assumption of uniform wage setting and consider the incentive for divisionalization under wage discrimination by the labor union.[9]

If the union discriminates wage between the firms and charges w_i and w_e to the incumbent and the entrant respectively, the optimal outputs and profits of the incumbent's division and the entrant are respectively

$$q_i^* = \frac{(a - 2w_i + r + w_e)}{3} \qquad \text{and} \qquad q_e^* = \frac{(a - 2w_e - 2r + w_i)}{3} \tag{14}$$

$$\pi_i^* = \frac{(a - 2w_i + r + w_e)^2}{9} \qquad \text{and} \qquad \pi_e^* = \frac{(a - 2w_e - 2r + w_i)^2}{9}. \tag{15}$$

The union chooses w_i and w_e to maximize the following expression:

$$\underset{w_i, w_e}{Max} \frac{w_i(a - 2w_i + r + w_e) + w_e(a - 2w_e - 2r + w_i)}{3}. \tag{16}$$

The optimal wage rates are

$$w_i = \frac{a}{2} \qquad \text{and} \qquad w_e = \frac{(a - r)}{2}. \tag{17}$$

Since the incumbent has full bargaining power and the reservation payoff of the new division is zero, therefore, at stage 1, the incumbent chooses r to maximize the following expression:

$$\underset{r}{Max} \frac{(a + r)^2 + (a - 2r)^2 + 6r(a - 2r)}{36}. \tag{18}$$

The optimal royalty rate is $r^* = \frac{2a}{7}$. Note that both firms produce positive amount in this situation. It is worth noting that, since here the labor union discriminates wage, we do not need to satisfy a constraint similar to (12).

We find that *total* profit of the incumbent is $\pi_i^{*,d} = \dfrac{a^2}{14}$, which immediately

implies that divisionalization is a profitable strategy of the incumbent even under

wage discrimination. However, it is clear from the analyses under uniform wage and

wage discrimination that *total* profit of the incumbent under divisionalization is higher

under the former situation. So, the benefit from divisionalization is higher under

uniform wage setting, and, given a cost for opening the new division, divisionalization

may occur only under uniform wage setting.

The following proposition is immediate from the above discussion.

Proposition 2: *If the labor union discriminates wage between the firms, divisionalization is still a profitable strategy for the monopolist incumbent. However, the incentive for divisionalization is higher under uniform wage than wage discrimination.*

Even if the wage rate for the incumbent's division is the same under

divisionalization and monopoly, divisionalization helps to produce some amount of

output in a new firm with a relatively lower wage rate. However, the incumbent can

design a suitable licensing contract to soften competition in the product market and

also to extract profit from the new division, the benefit from lower wage rate in the

new division encourages for divisionalization. Since, under wage discrimination,

divisionalization does not give the advantage of lower wage rate in the incumbent's

division, thus reducing its benefit compared to uniform wage setting.

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[9] This wage setting behavior is similar to the centralized bargaining model of Bughin and Vannini (1995) and Vannini and Bughin (2000), and 'coordination' wage setting of Haucap and Wey (2004).

It is easy to check from (18) that if there is no output royalty to soften competition in the product market, the industry profit under divisionalization is $\frac{a^2}{18}$, which is lower than that of under monopoly, which is $\frac{a^2}{16}$. Therefore, without output royalty, divisionalization is an unprofitable strategy to the incumbent. Note that this situation of no output royalty under divisionalization is comparable to the discriminatory wage setting of Naylor (2002) but with a single labor union, and shows that here *exogenous* entry does not increase industry profit, thus showing *importance of the licensing contract under endogenous* entry, and making our result significantly different from Naylor (2002).

It is easy to find that divisionalization increases welfare under discriminatory wage setting compared to monopoly, since it increases industry profit, utility of the union and consumer surplus compared to monopoly.

4. Divisionalization: price competition

This section extends the basic model of section 3.1 in another direction, viz., to consider price competition under divisionalization, and shows that the incentive for divisionalization remains even under price competition. To abstract the effect of product differentiation, which makes divisionalization profitable even with no labor union (e.g., Wang and Yang, 1999), we consider the case of homogeneous product also under price competition.

It is trivial that the case of no divisionalization is similar to section 2. However, the analysis under price competition is different from quantity competition when there is competition in the product market.

Let us consider divisionalization. Given the positive royalty rate, since the effective marginal cost of the entrant is $(w+r)$, it is higher than the incumbent's marginal cost of production, i.e., w. So, in the product market the equilibrium price of the product will be $(w+r)$, [10] and the demand for labor is

$$q_I = a - w - r. \tag{19}$$

The union maximizes the following expression to determine the wage rate:

$$\underset{w}{Max}\, w(a - w - r). \tag{20}$$

The optimal wage rate is $w = \dfrac{(a-r)}{2}$. Utility of the labor union and *total* profit of the incumbent are respectively $U^{b,d} = \dfrac{(a-r)^2}{4}$ and $\pi_i^{b,d} = \dfrac{r(a-r)}{2}$. Therefore, if the incumbent maximizes $\pi_i^{b,d} = \dfrac{r(a-r)}{2}$ to determine the royalty rate, the optimal royalty rate will be $r = \dfrac{a}{2}$.

However, note that, given the royalty rate $r = \dfrac{a}{2}$, the labor union can always charge the wage rate $w = \dfrac{a}{2}$ to eliminate the credible threat of entry in the product market. Hence, like section 3.1, the incumbent should charge the royalty rate in a way so that the labor union charges its optimal wage rate corresponding to the duopoly market structure, i.e., $w = \dfrac{(a-r)}{2}$. Hence, the optimal royalty rate should satisfy:

$$\frac{(a-r)^2}{4} \geq \frac{a^2}{8}, \tag{21}$$

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[10] It assumes that, given the wage rate, monopoly price for the final good is greater than $(w+r)$. This happens if $a - 2r > w$.

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which gives the optimal royalty rate as $r^{b,d} = \dfrac{a(\sqrt{2}-1)}{\sqrt{2}}$, and the corresponding wage

rate is $w^{b,d} = \dfrac{a}{2\sqrt{2}}$.

Therefore, *total* profit of the incumbent is

$$\pi_i^{b,d} = \frac{a^2(\sqrt{2}-1)}{4}, \tag{22}$$

which is greater than the incumbent's profit under monopoly, thus making divisionalization as a profitable strategy for the monopolist.

Comparison of (22) with (13) shows that the former is always greater than the latter, showing higher profit of the incumbent in a product market with more intense competition. Therefore, it is immediate that, given a cost for opening the new division, it may be possible that divisionalization occurs only under price competition.

Recently, López and Naylor (2004) show that, if there is firm-specific labor union, price competition generates higher profit provided either the bargaining power of the labor union or the importance of wage in the utility of the labor union is very high. In contrast, our result shows that, if the labor union is industry-wide, price competition can generate higher profit compared to quantity competition even if the wage rate and employment get the same weight in the utility function of the union.[11]

The following proposition is immediate from the above discussion.

Proposition 3: *Divisionalization by a monopolist producer can be profitable even under price competition, and the incentive for divisionalization can be higher under price competition compared to quantity competition.*

The reason for profitable divisionalization under price competition is also attributable to the beneficial wage effect of divisionalization. The intuition for higher profit under price competition compared to quantity competition is as follows. In case of price competition, only the incumbent produces the final goods. Further, the wage rate is lower under price competition compared to quantity competition. So, while lower wage rate and higher market share tend to increase profit of the incumbent under price competition, lower price of the product tends to reduce its profit under price competition. However, a suitable licensing contract helps the incumbent to soften competition in the product market, thus reducing the negative product price effect. In balance, the positive wage rate and market share effects dominate the negative product price effect, and create higher profit under price competition.

It is also easy to see that divisionalization (compared to monopoly) increases welfare under price competition, since it increases industry profit and consumer surplus while generating the same utility for the labor union under divisionalization and monopoly.

5. Conclusion

Empirical evidences show that often a firm creates independent divisions that produce similar products and compete in the same market. Previous works show that, in an oligopolistic market, divisionalization has a business-stealing effect in the product market and makes it a profitable strategy.

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[11] In different contexts, Acharyya and Marjit (1998), Häckner (2000), Mukherjee (2005) and Zanchettin (2005) show higher profit of a firm under price competition than quantity competition in absence of labor union.

We provide a new rationale for divisionalization, and show that divisionalization can be a profitable for a monopolist producer. In contrast to the product market advantage, we show that divisionalization is profitable if it gives the monopolist strategic advantage in the labor market. While divisionalization helps to reduce the wage rate, it also increases competition in the product market. However, a suitably designed licensing contract helps the monopolist to soften product market competition while getting the benefit from lower wage rate, thus making divisionalization as a profitable strategy.

In an economy characterized by quantity competition in the product market under divisionalization, we show that divisionalization by the monopolist can be profitable under both uniform and discriminatory wage setting by the labor union. However, since the benefit from lower wage rate is higher under the uniform wage setting, the incentive for divisionalization is higher under uniform wage than wage discrimination. We also show that divisionalization can occur even under price competition, and the incentive for divisionalization is found to be higher under price competition than quantity competition.

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