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Profit Sharing and the Imperfectly Competitive Product Market: A Conduct Parameter Approach*

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Abstract

In the framework of Weyl and Fabinger (2013), I analyze how profit sharing between managers and workers affects the product price and the division of surplus under imperfect competition. I discuss a fundamental conflict of interest between workers/consumers and managers as to corporate policy and competition policy.

Keywords: Imperfect Competition; Conduct Parameter Approach; Profit Sharing.

JEL classification: D43; J52; L13.

1 Introduction

In the standard partial equilibrium analysis, corporate profit is the objective that is maximized by the choice of the product price. However, corporate profit may be divided by managers and workers for incentive reasons to weaken internal moral hazard (Shapiro and Stiglitz 1984 and Okuno-Fujiwara 1987). This note takes into account such a scheme of *corporate profit sharing* (Meade 1972 and Weitzman 1984) in the model of imperfect competition in the product market, and analyses the effects of internal bargaining on the product price and the division of surplus. In particular, I point out that while an increase in the managers' bargaining power is associated with an increase in consumer surplus, consumers/workers can become worse off because their surplus as workers becomes smaller. This implies a fundamental tension between consumers/workers and managers as to directions in corporate policy changes. However, it appears that the well-known tension between consumers and producers toward competition

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policy does not change: consumers/workers support competition policy, whereas managers are always tempted to be engaged in anti-competitive conduct.

2 Model

We start with pricing by a single-product monopolist. The aggregate market demand is denoted by $Q(p)$, where $p \geq 0$ is the market price. This demand is derived from the representative consumer problem, which we do not spell out for brevity. The monopolist's profit function is written as $\pi = pQ(p) - C(Q)$, where $C(Q)$ is the industry's cost of production.

The marginal profit gain by lowering price p at an output level Q is given by $m \times \Delta Q$, where $m \equiv p - MC$ is the *markup*, whereas, whereas the profit loss is given by $-\Delta p \times Q$. If the firm chooses to maximize its profit, it equates the marginal profit gain with the marginal profit loss:

$$\underbrace{m \times (\Delta Q)}_{\text{Marginal Gain}} = \underbrace{(-\Delta p) \times Q}_{\text{Maginal Loss}}.$$

Here, without loss of generality, we make a unit normalization such that the amount of labor for producing Q is $L = Q$, and the unit wage is $w \geq 0$. In this paper, we do not provide a detailed mechanism that describes the determination of w. In the phrase of Aoki (1988, p.152) when describing Weitzman's (1984) "share system," the monopolist has "the *unilateral* power to set the level of employment according to the profit-maximizing motive." Thus, the marginal cost has two parts: $MC(Q) = w + \widehat{MC}(Q)$, where $\widehat{MC}(Q)$ stands for the non-labor marginal costs.

Now, we introduce *imperfect competition* in the product market, using Weyl and Fabinger's (2013) conduct parameter approach. Specifically, symmetrically oligopolistic firms recognize that their products are not perfectly substitutable as in perfect competition nor they do not incur all marginal profit losses from lowering a price as in monopoly. In other words, they recognize that they only incur a $100 \times \theta$ percent of the marginal profit losses by lowering the price, where $\theta \in [0, 1]$ is the *conduct parameter* in the product market. Additionally, we introduce *profit sharing* in the internal organization of the firm. Specifically, the marginal profit gains from lowering the price are shared by the manager and the workers, and thus the manager obtains a $100 \times \lambda$ percent of the marginal gains, where $\lambda \in [0, 1]$ is the manager's *bargaining power*. Now, with these two modifications, the symmetric-firm "syndicate" equates the marginal profit gains with the marginal profit losses (see Figure 1):

$$\underbrace{(\lambda \cdot m) \times (\Delta Q)}_{\text{Marginal Gain}} = \underbrace{\theta \times (-\Delta p) \times Q}_{\text{Maginal Loss}},$$

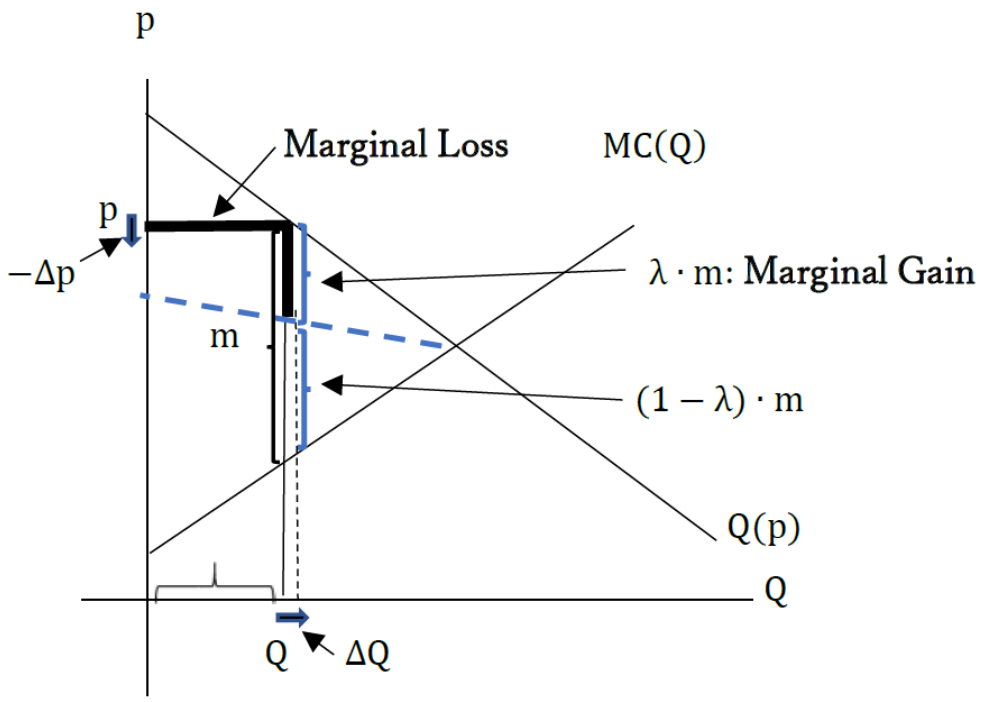

Figure 1: Marginal Profit Gain and Loss from Lowering the Product Price p

or in the form of the Learner formula,

$$\frac{p - MC}{p} = \frac{\theta}{\varepsilon\lambda},$$

where $\varepsilon(p) \equiv -\frac{p}{Q(p)}Q'(p)$ is the *industry-level price elasticity*. The surplus division under the profit sharing rule is depicted in Figure 2: we define the *united surplus* (US) by the sum of consumer surplus (CS) and worker surplus (WS), and the manager surplus (MS) by the producer surplus subtracted by the worker surplus. Social welfare (SW) is defined by: $SW = (CS + WS) + MS = US + MS$. Obviously, if $\lambda = 1$, the situation is nothing but the ordinary setting (i.e., *the no-profit-sharing economy*), where $WS = 0$ and MS is interpreted as producer surplus (PS).

Now, it is shown that

$$\frac{\partial p}{\partial \theta} = -\frac{Q}{\{\theta + \lambda \cdot [1 - mc' \cdot Q']\}Q' + \lambda\{p - MC[Q(p)]\}Q''} > 0$$

and

$$\frac{\partial p}{\partial \lambda} = -\frac{(p - MC)Q'}{\{\theta + \lambda \cdot [1 - mc' \cdot Q']\}Q' + \lambda\{p - MC[Q(p)]\}Q''} < 0$$

where $\{\theta + \lambda \cdot [1 - mc' \cdot Q']\}Q' + \lambda\{p - MC[Q(p)]\}Q'' < 0$ is assumed. Thus, an increase in the workers' bargaining power (i.e., a decrease in λ) reduces the consumer surplus.

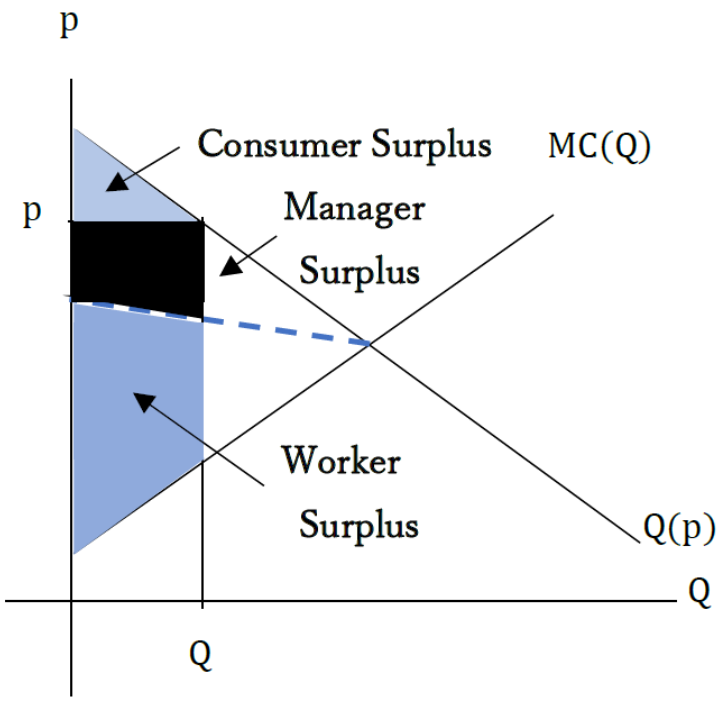

Figure 2: Surplus Division under the Profit Sharing Rule

3 A Linear Example

Now, we assume that $Q(p) = a - p$ and $MC(Q) = c + dQ$, where $a > c \geq 0$ and $d \geq 0$. Then, the equilibrium product price is obtained as

$$p = \frac{\lambda(c + ad) + a\theta}{\lambda(1 + d) + \theta},$$

which is always less than a as long as $a > c$, and

$$Q = \frac{(a - c)\lambda}{\lambda(1 + d) + \theta}.$$

Accordingly, the gross markup is

$$m = \frac{(a - c)\theta}{\lambda(1 + d) + \theta}.$$

It is observed that as the workers' bargaining power increases (a decrease in λ), the aggregate output decreases:

$$\frac{\partial Q}{\partial \lambda} = \frac{(a - c)\theta}{[\lambda(1 + d) + \theta]^2} > 0.$$

Now, the manager surplus is

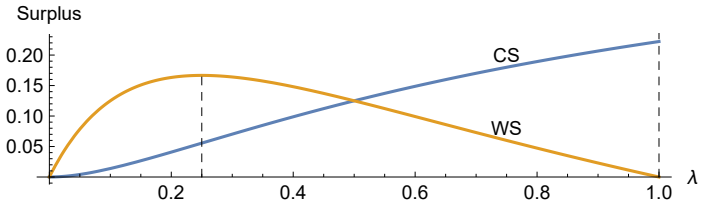

Figure 3: Consumer Surplus and Worker Surplus when $\theta = \frac{1}{2}$

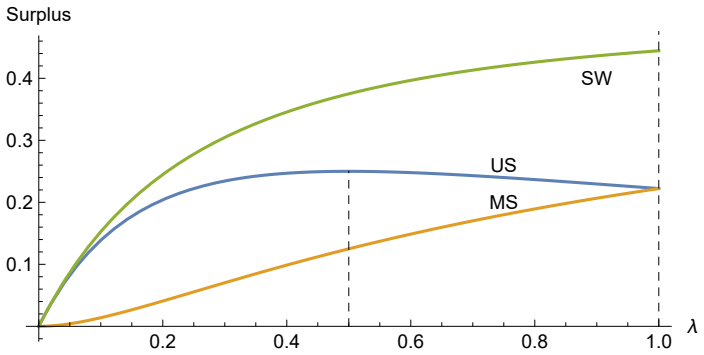

Figure 4: United Surplus, Manager Surplus, and Social Welfare when $\theta = \frac{1}{2}$

$$MS = \frac{\lambda^2(a-c)^2(2\theta + d\lambda)}{2[\lambda(1+d)+\theta]^2},$$

whereas the consumer surplus and the worker surplus are

$$CS = \frac{\lambda^2(a-c)^2}{2[\lambda(1+d)+\theta]^2},$$

and

$$WS = \frac{(1-\lambda)\lambda(a-c)^2(2\theta + d\lambda)}{2[\lambda(1+d)+\theta]^2},$$

respectively.

Now, we further assume that the marginal cost is constant (i.e., $d = 0$) and $a - c = 1$. First, suppose that $\theta = \frac{1}{2}$. Figure 3 depicts how the consumer surplus and the worker surplus changes as the manager's bargaining power, λ, increases. While CS increases monotonically because of the price reduction, WS attains its maximum value at $\lambda = \frac{1}{4}$. Thus, a natural question to ask is how the united surplus changes as λ increases. Figure 4 shows that while the manager surplus and the social welfare monotonically increase as λ increases, US attains its maximum value at $\lambda = \frac{1}{2}$. In other words, there is a conflict of interest between the workers/consumers and the managers if $\lambda > \frac{1}{2}$: the society as a whole is happier whereas the citizens in the majority are less happier as the managerial authority is strengthened.

Next, we examine the effects of a change in the competitiveness in the product market, θ, by

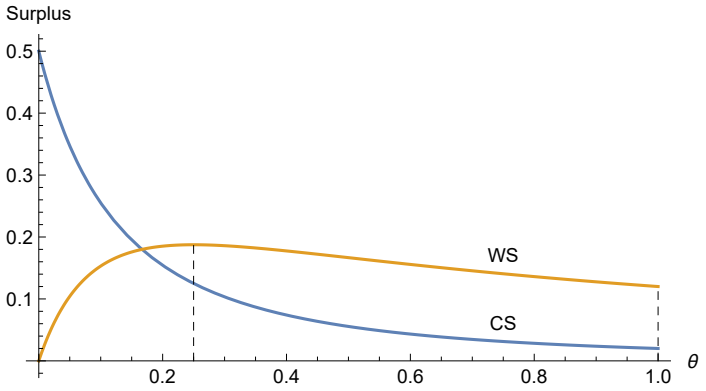

Figure 5: Consumer Surplus and Worker Surplus when $\lambda = \frac{1}{4}$

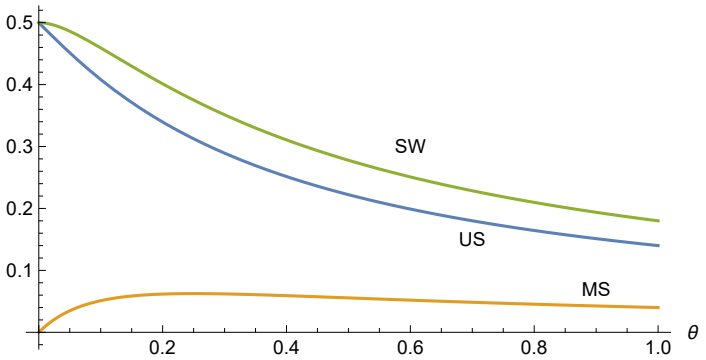

Figure 6: United Surplus and Manager Surplus when $\lambda = \frac{1}{4}$

supposing that $\lambda = \frac{1}{4}$, when WS is maximized for $\theta = \frac{1}{4}$. Naturally, WS attains its maximum value at $\theta = \frac{1}{4}$ as Figure 5 shows. CS is monotonically decreasing in θ. Figure 6shows that the workers/consumers are against anti-competitive conduct because US decreases as θ increases. However, the managers are tempted to increase θ because MS is increasing in θ.

As a summary, when the share economy, where corporate profit sharing is used for incentive reasons, is considered, corporate policy changes favoring management are resisted by the majority of citizens (i.e., workers/consumers) once they break over the critical point (in the above example, $\lambda = \frac{1}{2}$), competition policy is always welcomed by them, whereas managers are always tempted to raise θ.

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