On Entry Prevention of Monopson by Adjusting Labor Employment in the Presence of Tax Evasion

On Entry Prevention of Monopsony
by Adjusting Labor Employment
in the Presence of Tax Evasion

Shigeru Watanabe*

Abstract: A purpose of this paper is to analyze the entry prevention of monopsony by adjusting the employment of labor in the presence of tax evasion. In this paper, to focus on the effect of the tax evasion on the entry prevention, the classical Sylos posturate is considered. From the analysis of this paper following main results have been derived. The possibility that the entry is not blockaded will exist, even when the established firm adjusts the employment level such that the profit level of the prospective entrant can not be positive, if the potential entrant evades tax after entry. So the pure monopsony or the corner solution of the monopsony will not be attained since the entry is not blockaded. The possibility of the entry increases as the tax rate gets higher or the penalty rate of the tax evasion becomes lower. And the higher the efficiency of the labor or the lower the sensitivity of wage rate to the employment level, the higher the possibility.

Even if the realized profit of the monopsonist is different from the anticipated one, the monopsonist will not be able to obtain the true information, in general, of the tax evasion of the potential entrant both before the entry and after the entry. The monopsonist may consider many kinds of causes other than the tax evasion of the entrant, facing the realized entrance. Hence, the monopsonist cannot know the true reason why the realized profit is so low. Therefore, it will be difficult for the established firm to take effective strategies even after the entrance, which is the crucial point of taking the tax evasion into consideration in the analysis of entrance barriers.

Similar results hold when not only the potential entrant but also the established firm will evade the tax.

Key Words: Monopsony, Entry Prevention, Tax Evasion

＊Professor at the University of Osaka Prefecture, College of Economics, 1-1, Gakuencho, Nakaku, Sakai-City, Osaka 599-8531, Japan

1. Introduction

A purpose of this paper is to analyze the entry prevention of monopsony by adjusting the quantity of employment in the presence of tax evasion[1]. In this paper, to focus on the effect of the tax evasion on the entry prevention, the classical Sylos posturate[2] is considered, where the chosen output level is maintained though in this paper the chosen employment level is maintained.

From the analysis of this paper following main results have been derived. The possibility that the entry is not blockaded will exist, even when the established firm adjusts the employment level such that the profit level of the prospective entrant will not be positive, if the potential entrant evades tax after entry. So the pure monopsony or the corner solution of the monopsony may not be attained since the entry is not blockaded. The possibility of the entry increases as the tax rate gets higher or the penalty rate of the tax evasion becomes lower. And the higher the efficiency of the labor or the lower the sensitivity of wage rate to the employment level, the higher the possibility.

Even if the realized profit of the monopsonist is different from the anticipated one, the monopsonist will not be able to obtain the true information, in general, of the tax evasion of the potential entrant both before the entry and after the entry. The monopsonist may consider many kinds of causes other than the tax evasion of the entrant, facing the realized entrance. Hence, the monopsonist cannot know the true reason why the realized profit is so low. Therefore, it will be difficult for the established firm to take effective strategies even after the entrance, which is the crucial point of taking the tax evasion into consideration in the analysis of entrance barriers.

Similar results hold even when both the potential entrant and the established firm evade the tax.

In the next section, a simple model of the entry prevention of monopsony by adjusting labor employment in the presence of tax evasion will be examined. In the last section concluding remarks will be given.

2. Entry Prevention of Monopsony by Adjusting Labor Employment in the Presence of Tax Evasion

The expected profit of the prospective entrant is shown by the following equation (1)

in the presence of tax evasion when excise tax is considered.

$$E\pi_2 = p\lambda l_2 - \theta(l_1+l_2)l_2 - A - t(1-\epsilon_2)\lambda l_2 - \epsilon_2^2 Ft\lambda l_2, \qquad (1)$$

where production function of the established firm $x_1 = x(l_1)$, where l_1 is the employment by the established firm and that of the potential entrant $x_2 = x(l_2)$, where l_2 is the employment by the potential entrant, wage rate function $w = w(l_1+l_2)$, and the probability $q(\epsilon)$ of detection of the tax evasio, which is the increasing function of the understatement rate, ϵ, are specified respectively such that

$x_1 = \lambda l_1, x_2 = \lambda l_2$, where λ is the efficiency of the labor $w = \theta(l_1+l_2)$, where θ is sensitivity of the wage rate to the total labor supply,

$$q(\epsilon_i) = \epsilon_i, \quad i = 1, 2.$$

and p is the price level of the output, t is the excise tax rate, and A is the initial starting and preparing costs such as costs for newly employing the laborers and costs of many kinds of contract for starting the firm but additional fixed cost are not considered for simplicity.

Maximizing the equation (1) with respect to the employment level, l_2, and the rate, ϵ_2, of the understatement with respect to the output level yields the following first order conditions.

$$\frac{\partial E\pi_2}{\partial l_2} = p\lambda - \theta l_1 - t(1-\epsilon)\lambda - \epsilon^2 Ft\lambda - 2\theta l_2$$

$$= 0, \qquad (2)$$

$$\frac{\partial E\pi_2}{\partial \epsilon_2} = t\lambda l_2 - 2\epsilon_2 Ft\lambda l_2$$

$$= 0. \qquad (3)$$

Second order conditions are satisfied.

$$\frac{\partial^2 E\pi_2}{\partial l_2^2} = -2\theta < 0, \qquad (4)$$

$$\begin{vmatrix} \dfrac{\partial^2 E\pi_2}{\partial l^2} & \dfrac{\partial^2 E\pi_2}{\partial l \partial \epsilon_2} \\[2mm] \dfrac{\partial^2 E\pi_2}{\partial \epsilon_2 \partial l_2} & \dfrac{\partial^2 E\pi_2}{\partial \epsilon_2^2} \end{vmatrix} > 0, \qquad (5)$$

where $\dfrac{\partial^2 E\pi_2}{\partial \epsilon_2^2} = -2t\lambda l_2 F < 0$, and $\dfrac{\partial^2 E\pi_2}{\partial l \partial \epsilon_2} = 0.$

Hence, from (1), (2) and (3) the employment level of the established firm which makes the expected profit of the prospective entrant zero is straightforwardly shown as

$$\hat{l}_1 = \frac{1}{\theta}\left\{(p-t)\lambda - 2\sqrt{\theta A} + \frac{t\lambda}{4F}\right\}. \tag{6}$$

In the same way in the absence of the tax evasion, the employment level of the established firm which makes the profit of the prospective entrant zero is straightforwardly shown as

$$\check{l}_1 = \frac{1}{\theta}\left\{(p-t)\lambda - 2\sqrt{\theta A}\right\}. \tag{7}$$

From (6) and (7) the following results can be obtained.
In the case 1, where

$$l_1 \geqq \hat{l}_1, \tag{8}$$

the established firm can prevent the entry, both in the absence of the tax evasion of the potential entrant and in the presence of the tax evasion of the potential entrant.
In the case 2, where

$$\hat{l}_1 > l_1 \geqq \check{l}_1, \tag{9}$$

the established firm can prevent the entry in the absence of the tax evasion of the potential entrant but the established firm cannot prevent the entry in the presence of the tax evasion of the potential entrant.
In the case 3, where

$$\check{l} > l_1, \tag{10}$$

the established firm can not prevent the entry both in the absence of the tax evasion of the potential entrant and in the presence of the tax evasion of the potential entrant.

On the other hand, the difference, Z, between (6) and (7) is denoted as

$$Z = \frac{t\lambda}{4\theta F}. \tag{11}$$

Hence, the following results can be obtained.

$$\frac{\partial z}{\partial t} > 0, \tag{12}$$

$$\frac{\partial z}{\partial \lambda} > 0, \tag{13}$$

$$\frac{\partial z}{\partial \theta} < 0, \tag{14}$$

$$\frac{\partial z}{\partial F} < 0. \tag{15}$$

Therefore, the possibility that the entry is not blockaded will exist even when the established firm adjusts the employment level such that the profit level of the prospective entrant can not be positive, if the potential entrant evades tax after entry and maximizes the expected profit instead of maximizing the profit. And the possibility of that entry increases as the tax rate gets higher or the penalty rate of the tax evasion becomes lower. Further the higher the efficiency of the labor or the lower the sensitivity of wage rate to the employment level, the higher the possibility.

When the established firm does not evade tax, the optimal employment level, l_1^*, in pure monopsony of the established firm can straightfowrardly be obtained.

$$l_1^* = \frac{(p-t)\lambda}{2\theta}. \tag{16}$$

Hence, if the following inequalities (17) hold, the pure monopsony can be attained by the established firm if the potential entrant does not evade tax, but if the potential entrant evades tax after entrant the monopsony by the established firm can not be attained.

$$\frac{(p-t)\lambda}{4} \leqq \sqrt{\theta A} < \frac{(p-t)\lambda}{4} + \frac{t\lambda}{8F}. \tag{17}$$

Therefore, from the simple calculations, in the absence of the tax evasion of the potential entrant the realized profit of the monopsonist is denoted by (18).

$$\pi_1^* = \frac{(p-t)^2\lambda^2}{4\theta}. \tag{18}$$

On the other hand, in the presence of the tax evasion of the potential entrant, the realized profit is denoted by (19).

$$\pi_1 = \frac{1}{8\theta}(p-t)^2\lambda^2 - \frac{t\lambda^2(p-t)}{16\theta F}. \tag{19}$$

The difference, J, of (18) and (19) is shown as

$$J = \left\{ p - t\left(1 - \frac{1}{2F}\right)\right\} \frac{(p-t)\lambda^2}{8\theta}. \tag{20}$$

The following results are straightforwardly obtained.

$$\frac{\partial J}{\partial t} < 0, \tag{21}$$

$$\frac{\partial J}{\partial \lambda} > 0, \tag{22}$$

$$\frac{\partial J}{\partial \theta} < 0, \tag{23}$$

$$\frac{\partial J}{\partial F} < 0. \tag{24}$$

Even if the realized profit of the monopsonist is different from the anticipated profit, the monopsonist will not be able to obtain the true information, in general, of the tax evasion of the potential entrant both before the entry and after the entry. The monopsonist may consider many kind of reasons other than the tax evasion of the entrant, facing the realized entrance. Hence, the monopsononist cannot know the true reason why the realized profit is so low. Therefore, it will be difficult for the established firm to take effective strategies even after the entrance, which is the crucial point of taking the tax evasion into consideration in the analysis of entrance barriers.

Similar analysis can be made also in the case where both the potential entrant and the established firm evade the tax.

In this case the expected profit of the established firm in the case of the monopsony can be denoted by the following equation.

$$E\pi_1 = p\lambda l_1 - \theta l_1^2 - t(1-\epsilon_1)\lambda l_1 - \epsilon_1^2 Ft\lambda l_1. \tag{25}$$

Maximizing the equation (25) with respect to the employment level and the rate of the understatement of output level yields the following first order conditions.

$$\frac{\partial E\pi_1}{\partial l_1} = p\lambda - 2\theta l_1 - t(1-\epsilon_1)\lambda - \epsilon_1^2 Ft\lambda$$
$$= 0, \tag{26}$$

$$\frac{\partial E\pi_1}{\partial \epsilon_1} = t\lambda l_1 - 2\epsilon_1 Ft\lambda l_1$$
$$= 0. \tag{27}$$

Second order conditions are satisfied.

$$\frac{\partial^2 E\pi_1}{\partial l_1^2} < 0, \tag{28}$$

$$\begin{vmatrix} \dfrac{\partial^2 E\pi_1}{\partial l_1^2} & \dfrac{\partial^2 E\pi_1}{\partial l_1 \partial \epsilon_1} \\[3mm] \dfrac{\partial^2 E\pi_1}{\partial \epsilon_1 \partial l_1} & \dfrac{\partial^2 E\pi_1}{\partial \epsilon_1^2} \end{vmatrix} > 0, \tag{29}$$

where $\dfrac{\partial^2 E\pi_1}{\partial \epsilon_1^2} = -2t\lambda l_1 F < 0, \dfrac{\partial^2 E\pi_1}{\partial l \partial \epsilon_1} = 0.$

Hence, the employment level and output understatement rate of the established firm which maximizes the expected profit are straightforwardly derived;

$$l_1^{**} = \frac{1}{2\theta}\left\{(p-t)\lambda + \frac{t\lambda}{4F}\right\}, \tag{30}$$

$$\epsilon_1^{**} = \frac{1}{2F}. \tag{31}$$

Hence, if the following inequalities hold, the pure monopsony which maximizes the expected profit instead of the profit can be attained by the established firm which evades tax, if the potential entrant does not evade the tax, but if the potential entrant evades the tax after entrant, the monopsony by the established firm cannot be attained.

$$\frac{(p-t)\lambda}{4} - \frac{t\lambda}{16F} \leqq \sqrt{\theta A} < \frac{(p-t)\lambda}{4} + \frac{t\lambda}{16F} \tag{32}$$

On the other hand, simple calculations show that in the absence of the tax evasion of the established firm and the potential entrant,

if $l_R > \dfrac{1}{\theta}\left\{(p-t)\lambda - 2\sqrt{\theta A}\right\} > \dfrac{(p-t)\lambda}{2\theta},$

where $l_R \equiv \left(1 + \dfrac{1}{\sqrt{2}}\right)\dfrac{(p-t)\lambda}{2\theta},$

and l_R is l such that the profit of monopsony at corner solution is equal to the maximum profit of duopoly,

then the established firm will choose to prevent the entry and the corner solution of the monopsony in the absence of the tax evasion will be chosen.

However, if the potential entrant evades the tax after entrant, the monopsony of the established firm will not be attained if the following inequality holds;

$$l_R < \frac{1}{\theta}\left\{(p-t)\lambda - 2\sqrt{\theta A} + \frac{t\lambda}{4F}\right\}. \tag{33}$$

3. Concluding Remarks

A purpose of this paper is to analyze the entry prevention of monopsony by adjusting the employment of labor in the presence of tax evasion. In this paper, to focus on the effect of the tax evasion on the entry prevention, the classical Sylos posturate is considered.

From the analysis of this paper following main results have been derived. The possibility that the entry is not blockaded will exist, even when the established firm adjusts the employment level such that the profit level of the prospective entrant can not be positive, if the potential entrant evades tax after entry. So the pure monopsony or the corner solution of the monopsony will not be attained since the entry is not blockaded. The possibility of the entry increases as the tax rate gets higher or the penalty rate of the tax evasion becomes lower. And the higher the efficiency of the labor or the lower the sensitivity of wage rate to the employment level, the higher the possibility.

Even if the realized profit of the monopsonist is different from the anticipated one, the monopsonist will not be able to obtain the true information, in general, of the tax evasion of the potential entrant both before the entry and after the entry. The monopsonist may consider many kinds of caiuses other than the tax evasion of the entrant, facing the realized entrance. Hence, the monopsonist cannot know the true reason why the realized profit is so low. Therefore, it will be difficult for the established firm to take effective strategies even after the entrance, which is the crucial point of taking the tax evasion into consideration in the analysis of entrance barriers.

Similar results hold when not only the potential entrant but also the established firm will evade the tax.

Notes

1   See for the tax evasion Allingham and Sandmo (1972), Laszlo (2004), Peacock and Show (1982), and Watanabe (1986, 1987, 1989, 1996 a, 1996 b).

2   See, Bain (1956), Sylos－Labini (1962), Modigiliani (1958). On the other hand, for the role of investment in entry deterrence, see Dixit (1980).

References

M. G. Allingham and A. Sandmo, "Income Tax Evasion: A Theoretical Analysis," *Journal of Public Economics*, 1, 1972.

Bain, J. S. *Barriers to New Competition*, Harvard University Press, 1956.

A. Dixit, "The Role of investment in Entry Deterrence," *Economic Journal*, Vol. 90, 1980.

G. Laszlo, "Tax evasion, tax progression, and efficiency wages" *Economic Letters*, 82, 2004.

Modigliani, F. "New Developments on the Oligopoly Front", *Journal of Political Economy*, Vol. 66, 1958.

A. T. Peacock and Show, G. K, "Tax Evasion and Tax Revenue Loss", *Public Finance*, 1982.

Sylos－Labini, P. *Oligopoly and Technological Progress* Harvard University Press 1962.

S. Watanabe, "Income Tax Evasion: A theoretical Analysis", *Public Choice Studies* No 8, 1986.

─────────, "Tax Evasion and Asymmetric Laffer Curve", *Public Choice Studies* No 10., 1987.

─────────, "A Note on Taxation & Understated Monopoly Profit: Tax Evasion & Oversupply of Monopoly" *Public Choice Studies* No 14. 1989.

─────────, "A Note on a Basic Model of Efficiency Wage and Tax Evasion", *Bulletin of the University of Osaka Prefecture* Series D VOL, XL Mar. 1996 a.

─────────, "Further Note on Efficiency Wage & Tax Evasion" *Journal of Economic Studies* (*University of Osaka Prefecture*) No. 3, Vol. 41, Jun. 1996 b.