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**Equitable Consumers and Green Consumers
—Public Bads: Discrimination against Women—**

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Abstract: A purpose of this paper is to analyze equitable consumers as well as well known green consumers. The equitable consumers are defined as the consumers who want to consume the goods produced by the firm which does not discriminate against the women. In the same way the green workers are defined as the workers who want to work at the firm which takes the natural environment into consideration. The discrimination against the women can be regarded as public bads. Hence, the tax policy for decreasing the discrimination against the women has been examined. On the other hand, the subsidy for the expenditures for the natural environment has also been examined. From the analysis of this paper the following main results have been obtained. The equitable consumers increase the employment of the women even if the firm discriminates in favor of the

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men but against the women. The tax for decreasing the discrimination against the women will increase the employment of the women. The green consumers increases the expenditures by the firm for the natural environment. The green workers will increase the expenditures by the firm for the natural environment. The effect of the tax rate on the total amount of the tax revenue cannot be determined in general. Under the balanced budget, the equitable consumers, the green consumers and the green workers will decrease the subsidy rate which maximizes the expenditures for the environment. The equitable consumers will decrease the wage difference between the women and the men. The relationship between the emotional labor and equity will also be examined. The increase in the emotional labor may decrease the attainable utility from the given amount of consumption due to the decrease in the emotional human capital stock which will play an important role to derive the utility from the consumption. If the emotional labor decreases the attainable utility from the given amount of the consumption, the equity in terms of the consumption or in terms of the income will not implicate the equity in terms of the utility. Hence, even if both the wage rate and the labor time are not discriminated against the women, when the emotional labor is not adequately allocated between the women and the men, the equity in terms of the utility is not attained under such labor environment. The problem of the emotional labor in the hospital is important. It will be shown that only raising the wage rate of the emotional labor will not increase the supply of the emotional labor.

Keywords: Equitable Consumer, Green Consumer, Green Worker, Public Bads, Discrimination against Women, Subsidy for Environment, Tax Policy, Emotional Labor.

1. Introduction

A purpose of this paper is to analyze equitable consumers as well as well known green consumers. The equitable consumers are defined as the consumers who want to consume the goods produced by the firm which does not discriminate against the women. In the same way the green workers are defined as the workers who want to work at the firm which takes the natural

environment¹ into consideration. The discrimination against the women can be regarded as public bads. The equity² is one of the most important targets of the economic policy. Hence, the penalty tax policy for decreasing the discrimination against the women has been examined. On the other hand, the subsidy for the expenditures for the natural environment has also been examined.

From the analysis of this paper the following main results have been obtained. The equitable consumers increase the employment of the women even if the firm discriminates in favor of the men but against the women. The tax for decreasing the discrimination against the women will also increase the employment of the women even if the firm discriminates in favor of the men but against the women. The green consumers increase the expenditures by the firm for the environment. The subsidy for the expenditures for the natural environment will increase those expenditures by the firm for the natural environment. The green workers will also increase the expenditures by the firm for the natural environment. The green consumers and the green workers will increase the total amount of the subsidy to the environment expenditures. The equitable consumers will decrease the total amount of the penalty tax revenue. But the effect of the penalty tax rate on the total amount of the penalty tax revenue cannot be determined in general. Under the balanced budget, the equitable consumers, the green consumers and the green workers will decrease the subsidy rate which maximizes the expenditures for the environment. The equitable consumers will decrease the wage difference between the women and the men.

In the next section the importance of the generalized environment will be examined. A simple model of the equitable consumers, green consumers and green workers will be analyzed in section 3. In the last section concluding remarks will be given. The generalized environment includes not only natural environment but also labor environment³. The green consumers want to support clean air and water in the natural environment. In the same way the equitable consumers want to support equitable atmosphere in the labor environment. The importance of the natural environment has been analyzed in Harford (1978) and Watanabe (2010).

Further intensive economic analysis of the Equal Employment Opportunity Law based on Article 14 of the Constitution of Japan, i.e, right of equality, will

be made in a forthcoming paper, where in order to get policy implication for securing the equity the role of the Chief of the Labor Standards Inspection Office and that of the Minister of Health, Labor, and Welfare will be examined, taking both Article 4 of the Labor Standards Law and the notification of the Ministry of Health, Labor, and Welfare into consideration.

The relationship between the emotional labor⁴ and equity will also be examined. The increase in the emotional labor may decrease the attainable utility from the given amount of consumption due to the decrease in the emotional human capital stock which will play an important role to derive the utility from the consumption. If the emotional labor decreases the attainable utility from the given amount of the consumption, the equity in terms of the consumption or in terms of the income will not implicate the equity in terms of the utility. Hence, even if both the wage rate and the labor time are not discriminated against the women, when the emotional labor is not adequately allocated between the women and the men, the equity in terms of the utility is not attained under such labor environment. The problem of the emotional labor in the hospital is important. It will be shown that only raising the wage rate of the emotional labor will not increase the supply of the emotional labor.

2. A Simple Model of Equitable Consumers, Green Consumers and Green Workers

In the following the following utility function denoted by (1) will be considered.

$$\begin{aligned}
 u &= \alpha [P_x - (z + mn - \mu G)n - \{z + m(L - n) - \mu G\}(L - n) \\
 &\quad - (1 - s)G \\
 &\quad - t(L - 2n)^2] + \beta n + \gamma(L - n) \\
 &= \alpha [\{a - bx - \theta(L - 2n)^2 + \lambda \log G\}x \\
 &\quad - (z + mn - \mu G)n - \{z + m(L - n) - \mu G\}(L - n) \\
 &\quad - (1 - s)G \\
 &\quad - t(L - 2n)^2] + \beta n + \gamma(L - n), \tag{1}
 \end{aligned}$$

where $\alpha > 0$, $\beta < 0$, $\gamma > 0$ are assumed since we analyze the inequity of the discrimination against the women and the total employment is assumed to be given, the price of the product is specified such that

$$P = a - bx - \theta(L - 2n)^2 + \lambda \log G,$$

where $a > 0$, $b > 0$ and in order to focus on the allocation of the given employment, L , to the women, n , and to the men, $L - n$, the output level, x , which depends on L is given, $\theta > 0$ is assumed since equitable consumers are considered, then $L - 2n$ is the difference of the employment between the women and the men and $\lambda > 0$ since green consumers are taken into consideration, G is the expenditures for the environment, and the labor supply function is specified such that wage rate of the women is equal to $z + mn - \mu G$ and that of the men is equal to $z + m(L - n) - \mu G$, where $\mu > 0$ since the green workers are taken into consideration, and $m > 0$, and s is the rate of subsidy for the expenditures for the environment, and t is the tax rate.

Maximizing (1) with respect to the employment of the women and the expenditures for the environment yields the following first order conditions (2) and (3).

$$\begin{aligned} \partial u / \partial n = & \alpha \{ 4\theta(L - 2n)x - mn - (z + mn - \mu G) \\ & + m(L - n) \\ & + z + m(L - n) - \mu G \\ & + 4t(L - 2n) \} + \beta - \gamma \\ = & 0, \end{aligned} \quad (2)$$

$$\begin{aligned} \partial u / \partial G = & \alpha \{ \lambda x / G + \mu L - (1 - s) \} \\ = & 0. \end{aligned} \quad (3)$$

Second order conditions (4) and (5) are satisfied in the following manner.

$$\partial^2 u / \partial n^2 = -\alpha(8\theta x + 4m + 8t) < 0, \quad (4)$$

$$\partial^2 u / \partial n^2 \partial^2 u / \partial G^2 - (\partial^2 u / \partial n \partial G)^2 > 0, \quad (5)$$

where $\partial^2 \mathbf{u} / \partial \mathbf{n}^2 < 0$ from (4), $\partial^2 \mathbf{u} / \partial \mathbf{n} \partial G = 0$,

and $\partial^2 \mathbf{u} / \partial G^2 = -\alpha \lambda \mathbf{x} G^{-2} < 0$.

From the first order conditions (2) and (3), \mathbf{n}^* and G^* can be obtained straightforwardly.

$$\mathbf{n}^* = L/2 - (\gamma - \beta) / [\alpha \{4\mathbf{m} + 8(\theta \mathbf{x} + t)\}]. \quad (6)$$

$$G^* = \lambda \mathbf{x} / (1 - s - \mu L). \quad (7)$$

From (6) and (7) the following results can be obtained straightforwardly.

$$\partial \mathbf{n}^* / \partial \mathbf{m} > 0, \quad (8)$$

$$\partial \mathbf{n}^* / \partial \alpha > 0, \quad (9)$$

$$\partial \mathbf{n}^* / \partial \beta < 0, \quad (10)$$

$$\partial \mathbf{n}^* / \partial \gamma < 0, \quad (11)$$

$$\partial \mathbf{n}^* / \partial \theta = 8(\gamma - \beta) \mathbf{x} / \alpha \{4\mathbf{m} + 8(\theta \mathbf{x} + t)\}^{-2} > 0, \quad (12)$$

$$\partial \mathbf{n}^* / \partial t = 8(\gamma - \beta) / \alpha \{4\mathbf{m} + 8(\theta \mathbf{x} + t)\}^{-2} > 0. \quad (13)$$

Hence, the higher the marginal increase in the wage rate with respect to labor supply, the larger the employment of the women from (8). The higher the weight of the profit, the larger the employment of the women from (9). The stronger the discrimination against the women or in favor of the men, the smaller the employment of the women from (10) and (11). The stronger the affect of the equitable consumers, the larger the employment of the women from (12). The higher the rate of the tax based on the difference of the employment between the women and the men, the larger the employment of the women from (13).

In the same way we also get the following results.

$$\partial G^* / \partial \lambda > 0, \quad (14)$$

$$\partial G^* / \partial s > 0, \quad (15)$$

$$\partial G^* / \partial \mu > 0. \quad (16)$$

Hence, the stronger the affect of the green consumers or that of the green workers, the larger the expenditures for the environment from (14) and (16). In the same way, the higher the rate of the subsidy for the expenditures for the environment, the larger the expenditures for the environment from (15).

Next we will examine the effects on the total amount of the subsidy, S^* , and on the total tax revenue, T^* .

S^* and T^* can be denoted as (17) and (18).

$$S^* = s \lambda \mathbf{x} / (1 - s - \mu L), \quad (17)$$

$$T^* = t (\gamma - \beta)^2 \alpha^{-2} \{2\mathbf{m} + 4(\theta \mathbf{x} + t)\}^{-2} > 0. \quad (18)$$

Hence, the following results (19), (20), (21), (22), (23), (24), (25), (26) can be obtained straightforwardly.

$$\partial S^* / \partial s > 0, \quad (19)$$

$$\partial S^* / \partial \lambda > 0, \quad (20)$$

$$\partial S^* / \partial \mu > 0. \quad (21)$$

Hence, the higher the subsidy rate or the stronger the affect of the green consumers or that of the green workers, the larger the amount of the subsidy for the expenditures for the environment from (19), (20) and (21).

$$\partial T^* / \partial \alpha < 0, \quad (22)$$

$$\partial T^* / \partial \beta < 0, \quad (23)$$

$$\partial T^* / \partial \gamma > 0, \quad (24)$$

$$\partial T^* / \partial m < 0, \quad (25)$$

$$\partial T^* / \partial \theta < 0. \quad (26)$$

Hence, the higher the weight of the profit, the larger the tax revenue from (22). The stronger the discrimination against the women or in favor of the men, the larger the tax revenue from (23) and (24). The higher the marginal increase in the wage rate with respect to labor supply, the smaller the tax revenue from (25). The stronger the affect of the equitable consumers, the smaller the tax revenue from (26).

However the effects of the tax rate, t , on the total tax revenue cannot be determined straightforwardly.

$$\begin{aligned} & \partial T^* / \partial t \\ & = (\gamma - \beta)^2 \alpha^{-2} \{2m + 4(\theta x + t)\}^{-2} [1 - 8t / \{2m + 4(\theta x + t)\}]. \end{aligned} \quad (27)$$

Therefore we get the following result with respect to the effect of the tax rate on the total tax revenue.

$$\begin{aligned} & \partial T^* / \partial t > 0, \text{ if } t < (m/2) + \theta x, \text{ or} \\ & \partial T^* / \partial t = 0, \text{ if } t = (m/2) + \theta x, \text{ or} \\ & \partial T^* / \partial t < 0, \text{ if } t > (m/2) + \theta x. \end{aligned} \quad (28)$$

Since, T^* is maximized at $t = (m/2) + \theta x$, the maximized value, MT^* , can be denoted by the equation (29).

$$MT^* = \alpha^{-2} (\gamma - \beta)^2 / 32 (m + 2\theta x). \quad (29)$$

Under the condition of the balanced budget, we get the following maximum subsidy MS^* for the environment denoted by the equation (30).

$$MS^* = MT^* = \alpha^{-2} (\gamma - \beta)^2 / 32 (m + 2\theta x). \quad (30)$$

On the other hand, S^* is determined from (17). Further G^* and S^* are increasing functions of the subsidy rate, s , from (15) and (19). Therefore, Ms which maximizes G^* and S^* subject to budget balance can be obtained in the

following manner.

$$Ms = (1 - \mu L) / \{1 + (\lambda x / MT^*)\}. \quad (31)$$

Hence, the following results can also be obtained straightforwardly.

$$\partial Ms / \partial \theta < 0, \quad (32)$$

since $\partial T^* / \partial \theta < 0$.

$$\partial Ms / \partial \lambda < 0, \quad (33)$$

$$\partial Ms / \partial \mu < 0. \quad (34)$$

Hence, under the balanced budget, the equitable consumers, the green consumers and the green workers will decrease the subsidy rate which maximizes the expenditures for the environment from (32), (33) and (34).

Similarly, the wage difference between the women and the men can also be examined straightforwardly in the following manner. We can get the following results with respect to the wage difference, v^* .

$$\partial v^* / \partial \alpha < 0, \quad (35)$$

$$\partial v^* / \partial \beta < 0, \quad (36)$$

$$\partial v^* / \partial \gamma > 0, \quad (37)$$

$$\partial v^* / \partial m = (\gamma - \beta)(\theta x + t) / \{m + 2(\theta x + t)\}^{-2} > 0, \quad (38)$$

$$\partial v^* / \partial t < 0, \quad (39)$$

$$\partial v^* / \partial \theta < 0. \quad (40)$$

Hence, the higher the weight of the profit, the smaller the wage difference from (35). The stronger the discrimination against the women or in favor of the men, the larger the wage difference from (36) and (37). The higher the marginal increase in the wage rate with respect to labor supply, the larger the wage difference from (38). The higher the rate of the tax based on the

difference of the employment between the women and the men, the smaller the wage difference from (39). The stronger the affect of the equitable consumers, the smaller the wage difference from (40).

4. Emotional Labor and Equity

In this section of this paper the relationship between the emotional labor and equity will be referred. If the emotional labor decreases the attainable utility from the given amount of the consumption, the equity in terms of the consumption or in terms of the income will not implicate the equity in terms of the utility. Hence, even if both the wage rate and the labor time are not discriminated against the women, when the emotional labor is not adequately allocated between the women and the men, the equity in terms of the utility is not attained under such labor environment. The problem of the emotional labor in the hospital is important.

In this section it will be shown that raising the wage rate of the emotional labor will not increase the supply of the emotional labor but will decrease the supply of it. The intensive analysis of the relationship between the emotional labor and equity will be made in the forthcoming paper. In the following it is assumed that the increase in the emotional labor decreases the attainable utility from the given amount of consumption due to the decrease in the emotional human capital stock which will play an important role to derive the utility from the given amount of consumption.

To make the analysis simple the utility function is specified in the following manner.

$$U = \varepsilon(\ell) \text{Log } w \ell - \delta \ell^2, \quad (41)$$

where $\delta > 0$, $\varepsilon(\ell) > 0$, $d\varepsilon(\ell)/d\ell < 0$, $d^2\varepsilon(\ell)/d\ell^2 < 0$ and ℓ is the emotional labor, w is the wage rate, and the consumption level is denoted by $w\ell$.

Maximizing (41) with respect to the emotional labor yields the following first order condition.

$$dU/d\ell = (d\varepsilon/d\ell) \text{Log } w \ell + \varepsilon(\ell)/\ell - 2\delta \ell = 0. \quad (42)$$

$$\frac{d^2 U}{d\ell^2} = 2\ell^{-3} \text{Log } w \ell - \ell^{-3} - 2\ell^{-3} - 2\delta.$$

From (42),

$$\begin{aligned} \frac{d^2 U}{d\ell^2} &= -\ell^{-3} - 6\delta \\ &< 0. \end{aligned} \tag{43}$$

Hence, the second order condition is satisfied.

Totally differentiating (42) yields the following result straightforwardly.

$$\partial\ell / \partial w < 0. \tag{44}$$

Hence, raising the wage rate of the emotional labor will decrease the supply of the emotional labor.

5. Concluding Remarks

The generalized environment includes not only natural environment but also labor environment. The green consumers want to support clean air and water in the natural environment. In the same way the equitable consumers want to support equitable atmosphere in the labor environment.

The equitable consumers are defined as the consumers who want to consume the goods produced by the firm which does not discriminate against the women. In the same way the green workers are defined as the workers who want to work at the firm which takes the natural environment into consideration.

From the analysis of this paper the following main results have been obtained.

- (i) The equitable consumers increase the employment of the women even if the firm discriminates in favor of the men but against the women.
- (ii) The tax for decreasing the discrimination against the women will also increase the employment of the women even if the firm discriminates in favor of the men but against the women.
- (iii) The green consumers increases the expenditures by the firm for the environment.
- (iv) The subsidy for the expenditures for the natural environment will

increase those expenditures by the firm for the natural environment.

- (v) The green workers will also increase the expenditures by the firm for the natural environment.
- (vi) The green consumers and the green workers will increase the total amount of the subsidy to the environment expenditures.
- (vii) The equitable consumers will decrease the total amount of the penalty tax revenue. But the effect of the penalty tax rate on the total amount of the penalty tax revenue cannot be determined in general.
- (viii) Under the balanced budget, the equitable consumers, the green consumers and the green workers will decrease the subsidy rate which maximizes the expenditures for the environment.
- (ix) The equitable consumers will decrease the wage difference between the women and the men.

Therefore if it is easy for the consumers to find the equitable goods as well as the green goods, then potential equitable consumers and potential green consumers can be real equitable and green consumers. Both green seal and equitable seal on the consumption goods will be useful for increasing the real equitable and green consumers.

The relationship between the emotional labor and equity will also be examined. If the emotional labor decreases the attainable utility from the given amount of the consumption, the equity in terms of the consumption or in terms of the income will not implicate the equity in terms of the utility. Hence, even if both the wage rate and the labor time are not discriminated against the women, when the emotional labor is not adequately allocated between the women and the men, the equity in terms of the utility is not attained under such labor environment. The problem of the emotional labor in the hospital is important. Following result has been derived with respect to the supply of the emotional labor.

- (x) Raising the wage rate of the emotional labor decreases the supply of the emotional labor.

Notes

1. See Harford (1978), Watanabe (2010), Watanabe and Sada (2011a), Watanabe and Sada (2011b) for the economic approaches to the

environment.

2. See Arrow (1972), Becker (1957), Fujino and Tamura (1977), Watanabe (2012) for the economic approaches to the equity.
3. See Watanabe, Mattheus and Elliott (2012) for the labor market.
4. See Hochschild (1983) for the emotional labor.

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