Law and Economics
－on Article 14 of the Constitution of Japan－

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From the standpoint of law and economics, the Article 14 of the Constitution of Japan will be analyzed using the simple but originally generalized model, which includes well known Arrow's model as a special case.

Key words: Law and Economics, Article 14, The Constitution of Japan, Arrow

1. Introduction

Under the Article 14 of the Constitution of Japan, all of the people are equal in political, economic or social relations. From the standpoint of law and economics[1], the Article 14 of the Constitution will be analyzed.

In the next section 2, a simple but generalized model which includes Arrow's model[2] as a special case, will be shown. In section 3, comparative static analysis will be made. And the unfair[3] difference between the value of the marginal product of the labor and wage rate will also be examined. In the last section 4, concluding remarks will be given.

2. A Simple but Generalized Model

According to Arrow (1972), the utility U of the firm is denoted by the following equation.

$$U = a\pi + bM + cL, \tag{1}$$

where π is the profit, M is the employment of men, and L is the employment of women, $a>0, b > 0$ and $c <0$ are assumed according to Arrow (1972).

To make the analysis simple, the efficiency of the men is assumed to be equal to that of the women and π is specified in the following manner

$$\pi = Pvlog(M+L) - yM - zL + S - t(M-L)^2 , \tag{2}$$

where P is a price level and $vlog(M+L)$ is a production function, y is a wage rate for men given in the labor market and z is that for women, and $S - t (M-L)^2$ is the amount of the subsidy for the firm.

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In the above generalized simple model, the special case such that $S=t=0$, corresponds the Arrow's model.

Hence, in this generalized model, U is shown in the following manner.

$$U = a\{Pvlog(M+L) - yM - zL + S - t(M-L)^2\} + bM + cL, \tag{3}$$

where $y > z$ is assumed.

Maximizing U with respect to M and L yields the following first order conditions.

$$\partial U/\partial M = a\{Pv/(M+L) - y - 2t(M-L)\} + b$$
$$= 0 \tag{4}$$

and

$$\partial U/\partial L = a\{Pv/(M+L) - z + 2t(M-L)\} + c$$
$$= 0 \tag{5}$$

Second order conditions are satisfied in the following manner.

$$-a\,Pv(M+L)^{-2} - 2at < 0 \tag{6}$$
$$8a^2\,Pv(M+L)^{-2}\,t > 0 \tag{7}$$

From (4) and (5) the optimal value of M and L are obtained straightforwardly.

$$M^* = Pv/\{y+z-(b+c)/a\} + \{z-y+(b-c)/a\}/8t, \tag{8}$$

where $M^* > 0$ is assumed.

$$L^* = Pv/\{y+z-(b+c)/a\} + \{y-z-(b-c)/a\}/8t, \tag{9}$$

where $L^* > 0$ is assumed.

3. Value of Marginal Product of Labor

From (8) and (9) the following results are obtained straightforwardly.

$$\partial M^*/\partial b > 0 \tag{10}$$

$$\partial L^*/\partial c > 0 \tag{11}$$

The sign of $\partial M^*/\partial a$ and $\partial L^*/\partial a$ can not be determined in general, however, in the special case such that the absolute value of c (<0) is equal to b (>0), then the following results denoted by (12) and (13) can be obtained straightforwardly.

$$\partial M*/\ \partial a < 0 \tag{12}$$

$$\partial L*/\ \partial a > 0 \tag{13}$$

From *(8)* and *(9)* the following results can also be obtained straightforwardly.

$$M*-L*=\{z-y+(b-c)/a\}/4t, \tag{14}$$

Therefore, the following results can also be obtained straightforwardly.

$$M*>L*$$
$$\qquad \text{if} \quad (b-c)/a > y-z \tag{15}$$

Hence, if the preference of the men to the women is sufficiently large relative to the wage rate difference between the men and women, then the employment of the men is larger than that of the women when the employment of the men is expensive even if the efficiency of the men is assumed to be equal to that of the women.

$$M*<L*$$
$$\qquad \text{if} \quad (b-c)/a < y-z \tag{16}$$

On the other hand, if the preference of the men to the women is sufficiently small relative to the wage rate difference between the men and women, then the employment of the men is smaller than that of the women.

$$M*=L*$$
$$\qquad \text{if} \quad (b-c)/a = y-z \tag{17}$$

Similarly, the result of the equality can also be obtained straightforwardly.
The following results can also be obtained straightforwardly from *(14)*.

$$\partial(M*-L*)/\partial a < 0 \tag{18}$$

Hence, if the weight of the profit is increased, then the difference of the employment between the men and the women demoted by $M*-L*$ will be decreased.

$$\partial(M*-L*)/\partial b > 0 \tag{19}$$

If the preference of employing the men is increased the difference of the employment between the men and the women demoted by $M^* - L^*$ will increase.

$$\partial(M^* - L^*)/\partial c < 0 \tag{20}$$

If the feeling of the dislike for employing the women is reduced, the difference of the employment between the men and the women demoted by $M^* - L^*$ will be decreased.

$$\partial(M^* - L^*)/\partial y < 0 \tag{21}$$

If the wage rate of the men is raised, then the difference of the employment between the men and the women demoted by $M^* - L^*$ will be decreased.

$$\partial(M^* - L^*)/\partial z > 0 \tag{22}$$

If the wage rate of the women is raised, then the difference of the employment between the men and the women demoted by $M^* - L^*$ will increase.

$$\partial(M^* - L^*)/\partial t < 0,$$
$$\text{if} \quad M^* > L^* \tag{23}$$

If the rate with respect to the subsidy is raised, then the difference of the employment between the men and the women demoted by $M^* - L^*$ will be decreased, when the employment of the men is larger than that of the women.

Similarly
$$\partial(M^* - L^*)/\partial t \geqq 0,$$
$$\text{if} \quad L^* \geqq M^* \tag{24}$$

If the rate with respect to the subsidy is raised, then the difference of the employment between the men and the women demoted by $M^* - L^*$ will increase or be kept constant, when the employment of the women is larger than or equal to that of the men.

From *(8)* and *(9)* the following results can also be obtained straightforwardly.

$$M^* + L^* = 2Pv/\{y + z - (b+c)/a\} \tag{25}$$

The following results can also be obtained straightforwardly from *(25)*.

$$\partial(M*+L*)/\partial a < 0$$

$$\text{if} \quad b > -c.$$

where $b > 0$, and $c < 0$. (26)

Hence, if the degree of the preference of employing the men is larger than that of the dislike of employing the women, the total employment of the men and the women, then total output will be decreased when the weight of the profit is increased.

$$\partial(M*+L*)/\partial a > 0$$

$$\text{if} \quad b < -c.$$

where $b > 0$, and $c < 0$. (27)

Hence, if the degree of the preference of employing the men is smaller than that of the dislike of employing the women, the total employment of the men and the women, then the total output will increase when the weight of the profit is increased.

$$\partial(M*+L*)/\partial a = 0$$

$$\text{if} \quad b = -c.$$

where $b > 0$, and $c < 0$. (28)

Hence, if the degree of the preference of employing the men is equal to that of the dislike of employing the women, the total employment of the men and the women, then the total output will not be affected by the increase in the weight of the profit.

$$\partial(M*+L*)/\partial b > 0 \tag{29}$$

If the preference of employing the men is increased, then the total employment of the men and the women, hence the total output will increase.

$$\partial(M*+L*)/\partial c > 0 \tag{30}$$

If the feeling of dislike for employing the women is reduced, then the total employment of the men and the women, hence the total output will increase.

$$\partial(M*+L*)/\partial y < 0 \tag{31}$$

If the wage rate of the men is raised, then the total employment of the men and the women, hence the total output will be decreased.

$$\partial(M^*+L^*)/\partial z < 0 \qquad\qquad (32)$$

If the wage rate of the women is raised, then the total employment of the men and the women, hence the total output will be decreased.

$$\partial(M^*+L^*)/\partial t = 0 \qquad\qquad (33)$$

The total employment of the men and the women, then the total output will not be affected by the increase in the rate with respect to the subsidy.

In the following, the difference between the value of the marginal product of the labor and the wage rate will be analyzed.

From *(4)* and *(5),* the following results can be derived straightforwardly.

With respect to the relation between the value of the marginal product of the men, $Pv/(M+L)$, and the wage rate, y, of the men, the following inequalities can be obtained from *(4)*.

$$Pv/(M+L) > y,$$
$$\text{if} \quad \{(-c)-b\}/a > y - z. \qquad\qquad (34)$$

In the same way, the following inequality is obtained.

$$y \geqq Pv/(M+L),$$
$$\text{if} \quad y - z \geqq \{(-c)-b\}/a. \qquad\qquad (35)$$

With respect to the relation between the value of the marginal product of the women, $Pv/(M+L)$, and the wage rate, z, of the women, the following inequalities can be obtained from *(5)*.

$$Pv/(M+L) > z,$$
$$\text{if} \quad \{(-c)-b\}/a > z - y. \qquad\qquad (36)$$

Similarly, the following inequality is also obtained.

$$z \geqq Pv/(M+L),$$
$$\text{if} \quad z - y \geqq \{(-c)-b\}/a. \qquad\qquad (37)$$

From *(34), (35), (36)* and *(37),* the following three cases will be analyzed.

Case 1: $y - z \geqq \{(-c)-b\}/a \geqq z - y$

If the feeling of dislike for employing the women, that of preference for employing the men and the weight of profit satisfy the above inequality, then the following results can be obtained straightforwardly.

$$y \geqq Pv/(M+L) \qquad\qquad (38)$$
and
$$Pv/(M+L) \geqq z \qquad\qquad (39)$$

Hence, the wage rate of the men is higher than the value of the marginal product of the men, however, the wage rate of the women is lower than that of the marginal product of the women. This results implicate that the women's wage rate is lower than the women's contribution to the production, while the men's wage rate is higher than the men's contribution to the production.

These results are contradictory to the spirit of the Article 14 of the Constitution of Japan.

Case 2: $y-z > z-y > \{(-c)-b\}/a$

In the same way, if the feeling of dislike for employing the women, that of preference for employing the men and the weight of profit satisfy the above inequality, in case 2, then the following results can also be obtained straightforwardly.

$$y > Pv/(M+L) \qquad\qquad (40)$$
and
$$z > Pv/(M+L) \qquad\qquad (41)$$

Hence, in this case, the wage rate of the men and the women are higher than the value of the marginal product of the men and the women.

Case 3: $\{(-c)-b\}/a > y-z > z-y$

Similar to the above cases, if the feeling of dislike for employing the women, that of preference for employing the men and the weight of profit satisfy the above inequality, in case 3, then the following results can also be obtained straightforwardly.

$$Pv/(M+L) > y \qquad\qquad (42)$$
and
$$Pv/(M+L) > z \qquad\qquad (43)$$

Therefore, in this case, the wage rate of the men and the women are lower than the value of the marginal product of the men and the women.

These results implicate that not only the wage rate of the women but also that of the men can

unfairly be lower than their contributions to the production. The above inequality in the case 3 can hold true, even if the feeling of preference, b (>0), for employing the men exists. If the absolute value of c (<0) is sufficiently large relative to b, the weight, a, of the profit, and the wage difference between the men and the women, $y-z$, then the above inequality in this case 3 can hold true. Therefore, the unfair feeling of dislike for employing the women is a serious matter which is concerned not only with the women but also with the men. Therefore, the spirit of the Article 14 of the Constitution of Japan is important for all of the people i.e. not only for the women but also for the men from the standpoint of law and economics.

4. Concluding Remarks

In this paper, from the standpoint of law and economics, the Article 14 of the Constitution of Japan has been analyzed. The simple but originally in this paper developed model, which includes Arrow's model as a special case, has been examined. As is well known, the implication of the Arrow's model is that so long as the preference for employing the men exists, the wage rate of the men is always higher than the marginal product of the men and so long as the dislike for employing the women exists, the wage rate of the women is always lower than the marginal product of the women.

However, from the analysis of the simple but in this paper originally generalized model, which includes Arrow's model as a special case, the following main results have been derived. Not only the women's wage rate but also the men's wage rate can unfairly be lower than their contributions to the production, even if the preference for employing the men exists. Therefore, the spirit of the Article 14 of the Constitution of Japan is important not only for the women but also for the men from the standpoint of law and economics.

Notes

1　See Maeda (2020), Watanabe and Maeda (2013 a), (2013 b), (2013 c) and (2014) for Law and Economics.
2　See Arrow (1972).
3　See Watanabe (1986), (1987), (1988), (1989) and (1994) with respect to the analyses of another unfair activity.

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