論　文

Law and Economics

－on Article 26 of the Constitution of Japan－

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As is well known, the Article 26 of the Constitution of Japan refers to the education. From the standpoint of law and economics, the education will be analyzed using the generalized model, which includes the well-known externality model of the education as a special case.

Key words: Law and Economics, Article 26, The Constitution of Japan, Education, Externality, Sharing System, Regional Society, Public Role

1. Introduction

As is well known, the Article 26 of the Constitution of Japan refers to the education. In this paper the education will be analyzed from the standpoint of the law and economics[1]. The education will play an important role in the development of the regional economy and urban economy. Supporting the sharing system of the educational cost will be an important public role.

Therefore, the education is not only the matter of the individual student but also that of the regional society. Using a simple but generalized model, which includes the well-known externality[2] model of education as a special case, the relation between the individual and the society will be analyzed.

In the next section 2, a simple but generalized model which includes the well-known externality model of education as a special case, will be shown. In section 3, with respect to the education, the relation between the individual and the society will be analyzed, considering the sharing system of the educational cost between the regional society and the individual student. In the last section 4, concluding remarks will be given.

2. A Generalized Model of Education

As is well known, the externality of the education is assumed to depend solely on the amount of the education.

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However, the above assumption is not always consistent with the mind of student from the standpoint of the realistic law and economics. If the sharing system of the educational cost is arranged between the regional society and the students, the externality of the education will be raised even if the amount of the education is not changed. This externality which depends not only on the amount of the education but also on the sharing system of the educational cost is defined as the generalized externality of the education in this paper.

The socially optimum education is analyzed in the following manner.

$$J = B(M) - (1-\lambda)C(M) - \lambda C(M) + X(M,\lambda), \quad (1)$$

$$Total\ Benefit = B + X, \quad (2)$$

$$Total\ Cost = C, \quad (3)$$

where J is the social welfare, $B(M)$ is the individual benefit of the education, $(1-\lambda)\ C(M)$ is the cost of the education shared by the student, $\lambda C(M)$ is the cost of the education shared by the society and $X(M, \lambda)$is the external effect of the education, i.e. the social benefit of the education, which depends not only on the amount of the education but also on the sharing rate of the educational cost between the student and the society, especially the regional society.

Maximizing J with respect to M yields the following first order optimum condition.

$$dJ / dM = a / M - b + g + h\lambda = 0, \quad (4)$$

where to make the analysis simple the functions are specified in the following manner: $B(M)=a\log M,\ a>0,\ C(M)=bM,\ b>0,$ and $X(M, \lambda)= (g + h\lambda) M,\quad g>0,\ h>0,$ and $0<\lambda<1$.

A special case, where $h=0$ then $X(M)=gM,$ corresponds to the well-known externality model of the education.

Second order optimal condition is satisfied.

$$d^2J / dM^2 = -a / M^2 < 0. \quad (5)$$

From *(4)* the social optimal value of M is obtained in the following manner.

$$M^{**} = a /(b - g - h\lambda), \quad (6)$$

where $M^{**} > 0$ is assumed.

On the other hand, the utility, U, of the individual is denoted by the following equation *(7)*.

$$U = a\log M - (1-\lambda)bM. \quad (7)$$

Maximizing U with respect to M yields the following first order optimal condition.

$$dU / dM = a / M - (1-\lambda)b = 0. \quad (8)$$

Second order optimal condition is satisfied.

$$d^2 U / dM^2 = -a / M^2 < 0. \quad (9)$$

Hence, the individual optimum value of the education is obtained in the following manner.

$$M^* = a /(1-\lambda) b. \quad (10)$$

3. Sharing System of Educational Cost

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

$$\partial M^{**} / \partial \lambda > 0. \quad (11)$$

Therefore, from *(11),* if the sharing rate of the regional society with respect to the educational cost is increased, the optimal value of the education for the regional society increases.

$$\partial M^{**} / \partial h > 0. \quad (12)$$

Therefore, from *(12),* if the externality of the educating becomes more sensitive to the sharing rate of the educational cost, the optimal value of the education for the regional society increases.

$$\partial M^{**} / \partial g > 0. \quad (13)$$

Therefore, from *(13),* if the constant additional part of the externality increases, the optimal value of the education for the regional society increases.

$$\partial M^{**} / \partial a > 0. \quad (14)$$

Therefore, from *(14),* if the utility of the individual student becomes more sensitive to the education, the optimal value of the education for the regional society increases.

$$\partial M^{**}/\partial b < 0. \qquad (15)$$

Therefore, from *(15),* if the education becomes more expensive, the optimal value of the education for the regional society decreases.

In the same way, from *(10)* the following results can also be obtained straightforwardly.

$$\partial M^{*}/\partial \lambda > 0. \qquad (16)$$

Therefore, from *(16),* if the sharing rate of the regional society with respect to the educational cost is increased, the optimal value of the education for the individual student increases.

$$\partial M^{*}/\partial a > 0. \qquad (17)$$

Therefore, from *(17),* if the utility of the individual student becomes more sensitive to the education, the optimal value of the education for the individual student increases.

$$\partial M^{*}/\partial b < 0. \qquad (18)$$

Therefore, from *(18),* if the education becomes more expensive, the optimal value of the education for the individual student decreases.

In the following, the relation between the optimal value of the education for the individual student and that for the regional society will be analyzed.

From *(6)* and *(10)*, the following result can be straightforwardly obtained.

If $\lambda = \lambda^{***} = g/(b-h)$,
where $\lambda^{***} > 0$ is assumed,
then $M^{*} = M^{**}$. *(19)*

In the same way,
If $\lambda < \lambda^{***}$
then $M^{*} < M^{**}$. *(20)*
and
If $\lambda > \lambda^{***}$
then $M^{*} > M^{**}$. *(21)*

Similarly, in the following, it can also be derived that at $\lambda = \lambda^{***}$, the total amount of the externality of the education will be equal to the total amount of the educational cost shared by the regional society.

The total amount of the externality of the education

at $\lambda = \lambda^{***} = g / (b - h)$ is denoted by

$$X (M^{***}(\lambda^{***}),\lambda^{***}) = (g + h\lambda^{***})M^{***}(\lambda^{***}) = \{g + h\, g / (b - h)\}M^{***}(g / (b - h)) \quad (22)$$

where $M^{***}(\lambda^{***}) = M^{**}(\lambda^{***}) = M^{*}(\lambda^{***})$.

On the other hand, the total amount of the educational cost shared by the regional society

at $\lambda = \lambda^{***} = g / (b - h)$ is denoted by

$$\lambda^{***} bM^{***}(\lambda^{***}) = \{bg / (b - h)\}M^{***}(g / (b - h)), \quad (23)$$

where $M^{***}(\lambda^{***}) = M^{**}(\lambda^{***}) = M^{*}(\lambda^{***})$.

Then, from *(22)* and *(23),* the following result can be obtained.

$$\begin{aligned} &X (M^{***}(\lambda^{***}),\lambda^{***}) - \lambda^{***} bM^{***}(\lambda^{***}) \\ &= \{g + h\, g / (b - h)\}M^{***}(g / (b - h)) \\ &\quad - \{bg / (b - h)\}M^{***}(g / (b - h)) \\ &= M^{***}(g / (b - h))\{g(b - h) + h\, g - bg\} / (b - h) \\ &= 0. \end{aligned}$$

Hence, at $\lambda=\lambda^{***}$, the total amount of the externality of the education is equal to the total amount of the educational cost shared by the regional society.

Similarly, the following results can also be obtained straightforwardly. If $\lambda<\lambda^{***}$, then the total amount of the educational cost shared by the regional society is smaller than the total amount of the externality of the education. If $\lambda>\lambda^{***}$, then the total amount of the educational cost shared by the regional society is larger than the total amount of the externality of the education.

The following results can also be derived straightforwardly.

$$\partial\lambda^{***} / \partial g > 0, \quad (24)$$

$$\partial\lambda^{***} / \partial b < 0, \quad (25)$$

$$\partial\lambda^{***} / \partial h > 0. \quad (26)$$

The sharing rate such that $M^{*}= M^{**}$ and the total amount of the externality is equal to that of the educational cost shared by the regional society will be raised if the constant additional externality of the education increases. If the education becomes more expensive, the sharing rate will decrease. If the externality of the education becomes more sensitive to the sharing rate, then the sharing rate will increase.

In the following the socially optimal sharing rate will be analyzed.

From *(1)* and *(10)*, the following social welfare is obtained straightforwardly.

$$J = B(M) - (1-\lambda)C(M) - \lambda C(M) + X(M,\lambda)$$
$$= a\log\{a/(1-\lambda)b\} + (g+h\lambda)\{a/(1-\lambda)b\} - b\{a/(1-\lambda)b\} \quad (27)$$

Maximizing J with respect to λ yields the following first order optimal condition.

$$dJ/d\lambda = a/(1-\lambda)\{1+(h/b) + (g+h\lambda)/b(1-\lambda) - 1/(1-\lambda)\} = 0. \quad (28)$$

From *(28)* the optimal value of λ is obtained straightforwardly.

$$\lambda^{**} = (g+h)/b, \quad (29)$$

where $0 < \lambda^{**} < 1$ is assumed.

Second order optimal condition is satisfied at $\lambda = \lambda^{**}$.

$$d^2J/d\lambda^2 = -a/(1-\lambda^{**})^2 < 0. \quad (30)$$

From *(29)* the following results can also be derived straightforwardly.

$$\partial\lambda^{**}/\partial g > 0 \quad (31)$$

$$\partial\lambda^{**}/\partial b < 0 \quad (32)$$

$$\partial\lambda^{**}/\partial h > 0 \quad (33)$$

The optimal sharing rate will be raised if the constant additional externality of the education increases. If the education becomes more expensive, the optimal sharing rate will decrease. If the externality of the education becomes more sensitive to the sharing rate, then the optimal sharing rate will increase.

Similarly, $\lambda^{**} > \lambda^{***}$ can also be obtained since $0 < \lambda^{**} < 1$ is assumed.

Therefore, the optimal value of the sharing rate which maximizes the social welfare will be larger than the sharing rate such that $M^* = M^{**}$ and the total amount of the externality is equal to that of the educational cost shared by the regional society.

4. Concluding Remarks

The educational cost sharing system between the individual student and the regional society has been analyzed in this paper. It has been derived that the cost sharing system of the education will bring about the situation such that the optimum educational level of individual student is equal to that of regional society. Further at the sharing rate, the total amount of the educational cost shared by the regional society is equal to that of the generalized externality of the education.

The optimal sharing rate which maximizes the social welfare will be raised if the constant additional externality of the education increases. If the education becomes more expensive, the optimal sharing rate will decrease. If the externality of the education becomes more sensitive to the sharing rate, then the optimal sharing rate will increase. The optimal value of the sharing rate which maximizes the social welfare will be larger than the sharing rate such that the optimum educational level of individual student is equal to that of regional society and the total amount of the externality is equal to that of the educational cost shared by the regional society.

The education will play an important role in the development of the regional economy and urban economy. Supporting the sharing system of the educational cost will be an important public role. If the cost sharing system of the educational cost is introduced to the regional society, the opportunities to receive an equal education will be given to the students even if they have not sufficient money to receive the education. This public role will be consistent with the spirit of the Article 26 of the Constitution of Japan.

Notes

1 See Maeda (2020, 2021), Watanabe and Maeda (2013a, 2013b, 2013c and 2014) for the analyses from the standpoint of law and economics.

2 See M. Mizuno (1989) for the externality. The education is related to the positive externality. Medical care is also related to the positive externality. See for the medical care Okuno and Watanabe (1980), Watanabe (1982).,Watanabe. et al. (2012). On the other hand, the environmental pollution is related to the negative externality. See for the negative externality Watanabe (1996, 2009, 2010a, 2010b).

References

(1) M. Maeda“ Law and Economics of Business Transactions － on FOB and Marine Accidents －”*Bulletin of Niigata Institute of Technology*, 2020.

(2) ――――――――――, “Law and Economics －on Article 14 of the Constitution of Japan－”*Bulletin of Niigata Institute of Technology*, 2021.

(3) M. Mizuno, Y. Kimura and M. Tsuji (ed), S. Watanabe, et al. *Dictionary of Economics,* Chuou Keizai, 1989.

(4) N.Okuno and Watanabe.S.“Medical Insurance and Social Security” *Journal of Economic Science,*

Nagoya University, No.1, Vol.28.1980.
(5) S.Watanabe and Maeda M. “A Note on Law and Economics － Cost plus Fee Contract and Generalized Efficiency Wages” *Journal of Economic Studies,* No.4, Vol.58, March 2013 a.
(6) ――――――――――――, “An Economic Approach to Law” *Economic Studies,* No.1, Vol.59, June 2013 b.
(7) ――――――――――――――, “On Law and Economics ”*Journal of Economics, Business and Law,* Dec. 2013 c.
(8) ――――――――――――――, “A Note on Law and Economics－Wage Rate Leadership, Price Leadership, Quality Leadership and Unemployment in the Absence of Efficiency Wages－” *Journal of Economic Studies,* No.2,3,4, Vol.59, March 2014.
(9) S.Watanabe,・Mattheus, Sebastian・Fusypudal, Elliott “Ineffizienzhypothese des Lohnsatzes in Abwesenheit von Eintrittsbarrieren im Arbeitsmarkt des Gesundheitswesens” *Journal of Economic Studies,* No.4, Vol.57, March, 2012.
(10) S.Watanabe, *Public Policy for Medical Care,* University of Osaka Prefecture, 1982.
(11) ――――”Policy mix of Tax Rate and Tax evasion Penalty Rate” *Journal of Economic Studies,* No.4, Vol.41, Sep. 1996.
(12) ――――, “A Note on Tax evasion―Environmental Policy in the Presence of Tax Evasion” *Journal of Economic Studies,* No.2, vol.55, Sep.2009.
(13) ――――,”A Note on Trade off between Environment and Tax Evasion” *Journal of Economic Studies,* No.4, vol.55, Mar. 2010.a.
(14) ――――,”A Note on Policy mix for Environment and Production in the Presence of Tax Evasion” *Journal of Economic Studies,* No.1, vol.56, Mar., 2010.b.