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International Factor Mobility, Efficiency Wage Rate, and Imperfect Competition

Kenji Kondoh[1]

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International Factor Mobility, Efficiency Wage Rate, and Imperfect Competition

1. Introduction

Most developed countries confront several economic crises, one of the most important and serious of which is a population decrease. For example, the production-age population of Japan, which was previously increasing, has been decreasing since 2000; moreover, Japan's total number of human capital stock—730,000—is diminishing every year. To maintain economic activity and scale, developed countries strive to conclude economic partnership agreements (EPA) with developing countries. Japan has already concluded EPA with both the Philippines and Indonesia, the result of which includes the introduction of a total of 1,000 nurses and nursing caregivers from both of these countries.

Some theoretical studies regarding the introduction of legal foreign workers have been conducted and most studies on the economic welfare of countries that allow international immigration have concluded that immigration benefits the host country. Typical examples of such studies are Berry and Soligo (1969), Rivera-Batiz (1982), Quibria (1989), Wong (1995), and Kondoh (1999). Chao and Yu (2002) considered the case of both skilled and unskilled workers. Djaic (1989) and Kondoh (2000) examined a

more general case in which each potential immigrant has a different skill. However, Kondoh (2008) is the only study that focused on EPA as a possible policy to help a country with a decreasing population. In Kondoh (2008), the developed country intends to secure a sufficient amount of qualified labour by introducing foreign unskilled workers and training them. Kondoh concluded that in order to obtain effective results from various policies, the government should only determine and announce the required skill training period while the total number of trainees must be considered as endogenously given. However, Kondoh (2008) is a 1-good 2-country model with no capital mobility, which is one of the most serious problem for developed countries.

Another serious crisis that developed countries face is a hollowing of industry caused by capital outflow. In order to save labour costs, a developed country's firms intend to change the location of their factory from the developed country to a developing country. This foreign direct investment (FDI) implies a loss of job opportunities for workers in the developed country, which often reduces the economic welfare of that country. Therefore, the governments of developed countries usually focus on moving the firms in their countries and sometimes apply various political methods to prevent the outflow of capital[1].

Ramaswami (1968) presented a famous proposition: the economic welfare of a

country that adopts the optimal immigration policy without any capital outflow must be larger than the economic welfare of a country that adopts the optimal capital outflow policy and does not allow immigration. The Ramaswami Proposition assumes that workers whose positions with the moving firm are terminated will be employed immediately by another firm, and full employment can be realized anytime. In this case, the government is not obligated to consider a relief program for the unemployment; however, in reality, a worker only finds a job, after the job searching period is over. In our paper, we assume that FDI causes a decrease in job opportunities; thus, the government will be eager to prevent it.

We also consider the real aspects of a modern economy. In reality, workers' wages are not determined by marginal products of labour pricing but by several other factors, such as an efficiency wage system or minimum wage restriction controlled by the administration or labour union. Moreover, we observe, especially in Japan, that there is a wage gap between domestic workers and foreign workers, even though there is no difference between their levels of productivity. To emphasize this discriminating aspect, we consider that domestic workers are guaranteed a legal minimum wage rate while foreign workers are not, even though they are legal immigrants. Furthermore, following Shapiro and Stiglitz (1984) and Milgrom and Roberts (1992), we assume with enough

reasonability that foreign workers, whose good attendance is regarded as suspicious, are paid by an efficiency wage rate, which could be higher than that in their home country with a larger profit of shirking and a smaller possibility of detection.

Another consideration is the reality of imperfect competition. For example, we usually consider that chocolates, Western Style tableware, or dress shirts made in Japan are of a similar quality as those made in the USA. Thus, Cournot style competition is the most reasonable means of explaining the behavior of two firms from two developed countries. However, even though made by the same firm, if the production of dress shirts moves to an Asian country, for example China, we do not consider the quality to be unchanged. Consumers tend to treat dress shirts made in China as slightly but not completely different goods from those made in the USA. Further, consumers usually compare the prices of these two shirts and if the US-made shirts (believed to be higher quality items) are not much more expensive than those made in China, they prefer to buy the shirt manufactured in the USA. Therefore, in this case, it would be more reasonable to apply Bertrand style competition.

We analyze the equilibrium of an economy in which the government is eager to prevent the outflow of a domestic firm, and where the firm has the option of choosing its investment location, but will confront Cournot (Bertrand) style competition with other

firms located in other developed countries if domestic production and exportation (FDI) are chosen. We also analyze the optimal policy for the government not only to prevent FDI but also to promote domestic welfare gain. This study is a Brander and Spencer (1985) style 3-country 2-firms imperfect competition model. Many extension studies about this model exist, but most of them concern tariff, tax, and subsidy policies. Hoekman and Saggi (2003) is an example that concludes that the political choice of a firm of the non-member of FTA countries—FDI or exportation—will be efficient if the government endogenously determines the tax or FDI policy.

This paper is organized as follows. Section 2 presents the model. In Section 3, we consider the case where the number of domestic workers is fixed and the number of foreign legal workers is endogenous. In Section 4, we consider the EPA case, where the number of foreign legal workers is given and the number of employed domestic workers is endogenous. Section 5 proffers some concluding remarks.

2. The Model

Let us consider three countries: Countries 1, 2, and 3. Countries 1 and 2 are developed like Japan and the U.S.A., while Country 3 is a developing country like China. Among many other firms, there is only one firm in each developed country—firm X and

Y (for example, Meiji and Hershey, respectively)—that produces chocolates and intends to export it to the market of country 3. Specific delicate technology is required to produce this type of high quality chocolate and it has been impossible to produce the similar item in country 3. The chocolate markets of both developed countries are under competition with other big domestic and foreign chocolate companies, for example Morinaga, LOTTE, Glico, M&M, Seattle, or Snickers, we assume that the market share of firm X or Y in the domestic market of each country is sufficiently small. Thus those two firms will endeavor to sell their commodities to country 3 and to simplify our analysis, we assume that the domestic demand of each developed country is zero for each firm. There is no difference between the qualities of chocolates produced in countries 1 and 2; therefore, those who consume chocolates in country 3 are indifferent to the production country. In this case, two firms enter country 3's market and compete in the Cournot style.

For country 1, in order to enhance international competition strength and stop the population decrease, a certain number of foreign workers from country 3, L_M, is introduced. In country 1, there exists a legal minimum wage rate that is applied to any domestic worker; however, the wage rate is not applied to those foreign workers. Firm X introduces efficiency wage rate $\overline{w}^*$ for those foreign workers[2]. In contrast to a

domestic worker, we assume that a worker from developing country 3 intends to shirk if shirking is beneficial. Let g denote the profit of shirking. Additionally, let θ be the probability of detection of any kind of shirking. We consider that θ should be positively related to the number of co-working domestic workers, L_D, and should be negatively related to the number of co-working legal foreign workers, L_M. To simplify our analysis, let us assume that $\theta = \theta(L_D - L_M), \theta' > 0$. If firm X detects a shirking worker, we assume that he will be fired and deported to country 3 immediately. In this case, his income should be equal to w^*. So we assume no penalty charge for those detected worker and he only loses his job in country 1. Now, under the above situation, to prevent shirking, $\overline{w}^*$ must satisfy the following condition:

$$\overline{w}^* \geq \theta w^* + (1-\theta)(g + \overline{w}^*).$$

Since firm X need not pay more than necessary, the above condition can be rewritten as

$$\overline{w}^* - w^* - \Theta = 0, \tag{1}$$

where Θ denotes the foreign worker's wage premium between two countries, country

1 and 3, which can be expressed as $\Theta \equiv \frac{1-\theta}{\theta} g$. Clearly, we have $\Theta_L \equiv \Theta_{L_D} = -\Theta_{L_M} < 0$ and $\Theta_g > 0$.

Let x and y be the output of firms X and Y, respectively. To simplify our analysis, we assume that there is no technology difference between developed countries and that one labour input can produce one chocolate in each country. Under the condition of (1), legal foreign workers have no motivation to shirk and will work earnestly. Thus, we assume that their productivity is equal to that of domestic workers, and we obtain the following production function for country 1:

$$x = L_D + L_M . \tag{2}$$

The legal minimum wage rate of each country is $\underline{w}$ and ω, respectively. In general, we can observe that the foreign worker's wage rate is discounted; namely, we assume $\overline{w}^* < \underline{w}$. The inverse demand function of chocolates in country 3 is as follows:

$$p = -\beta(x + y) + \gamma ,$$

where p is the price of this good, and β and γ are positive parameters.

The output of each firm in the Cournot equilibrium is

$$x = \frac{\gamma - 2w + \omega}{3\beta}, \tag{3}$$

$$y = \frac{\gamma - 2\omega + w}{3\beta}, \tag{4}$$

and from (2) and (3), we also obtain

$$L_D + L_M = \frac{\gamma - 2w + \omega}{3\beta}. \tag{5}$$

The profit of firm X (in the case of domestic production) is

$$\pi_X^D = \frac{(\gamma - 2w + \omega)^2}{9\beta}, \tag{6}$$

where w is the average wage rate in the equilibrium that should satisfy

$$w = \frac{\underline{w} L_D + \overline{w} * L_M}{L_D + L_M}, \tag{7}$$

where $\underline{w}$ is the minimum wage rate for domestic workers.

Now, let us consider the possibility that FDI is permitted and firm X moves to country 3. In country 3, the wage rate w^* is surely smaller than w. However, two problems exist. First, lacking a sufficient infrastructure, the labour productivity is smaller in country 3. We assume that one input of labour can produce only α units of output, where $\alpha < 1$. Second, because only foreign workers are employed, it is impossible to prevent shirking, which will surely reduce the quality of the produced chocolates. Thus, in this case, consumers in country 3 will either recognize that the chocolates manufactured in country 3 (which is produced by firm X of country 1) are not the same or be indifferent to those manufactured in country 1. Therefore, Cournot fashion competition will change to Bertrand fashion competition.

The demand functions of the chocolates in country 3 are as follows:

$$x = -Ap_x + Bp_y + C,$$

$$y = Dp_x - Ep_y + F,$$

where A, B, C, D, E, and F are positive parameters and we assume that $A > B$ and $D < E$ on the ordinary assumption that the absolute value of demand should be influenced more by a change in its own price than by a change in the price of

complementary goods. Each firm intends to maximize its profit, and we obtain the following FOCs:

$$-2Ap_x + Bp_y + C + A(w^*/\alpha) = 0,$$

$$Dp_x - 2Ep_y + F + E\omega = 0.$$

In equilibrium, the price of a chocolate produced by each firm is

$$p_x = \frac{B(F + E\omega) + 2E[C + A(w^*/\alpha)]}{4AE - BD},$$

$$p_y = \frac{D[C + A(w^*/\alpha)] + 2A(F + E\omega)}{4AE - DB}.$$

Thus, the profit of firm X in this case can be expressed as

$$\pi_X^F = \frac{A\{B(F + E\omega) + 2E[C + A(w^*/\alpha)] - (4AE - DB)(w^*/\alpha)\}^2}{(4AE - DB)^2}. \quad (8)$$

Now, we can consider a three-stage-game.

Stage 1: The government of country 1 chooses $\underline{w}$.

Stage 2: Firm X determines the location of production as either country 1 or

country 3.

Stage 3: Firm X competes with firm Y in country 3's market.

In the first stage, the government of country 1 intends to prevent the outflow of firm X because that will cause the unemployment of L_D number of domestic workers. Therefore, the government chooses the minimum wage rate for domestic workers employed by firm X. In the second stage, firm X prefers to continue production in country 1 under a certain domestic minimum wage rate presented by the government. Moreover, in the third stage, to satisfy conditions (1) and (5), the firm determines the optimal level of the foreign workers' efficiency wage rate, $\overline{w}^*$, and the optimal employment rate of foreign workers, L_M. In this case, as the total amount of domestic production x equals $L_D + L_M$ and L_D is exogenously given, determining L_M is the same as determining x.

In the first stage, the government of country 1 determines $\underline{w}$ in order to satisfy the following:

$$G \equiv \pi_X^D - \pi_X^F \geq 0. \tag{9}$$

In this case, as the objective of country 1 is only to prevent moving firm X, inequality (9)

can be replaced with the following equation:

$$G \equiv \pi_X^D - \pi_X^F = 0. \qquad (9')$$

Now we obtain (9') as the necessary condition for the government. As a result, we have three equations—(1), (5), and (9')—to express the equilibrium conditions.

3. The Case of Endogenous Foreign Legal Workers

First, let us assume that due to the result of negotiation with labor union, firm X employs all of domestic workers. Therefore, we may consider that L_D is at least exogenously given in the short-term period. When variables L_D, w^*, α, and g are exogenously given, we obtain three endogenous optimal variables from (1), (5), and (9'), respectively: $\underline{w}$, L_M and $\overline{w}^*$.

The total differential of those three equations yields the following:

$$\begin{bmatrix} \Psi L_D & 1+\Psi\bar{w}^* & \Psi L_M \\ 0 & \Theta_L & 1 \\ \Omega L_D & \Omega\bar{w}^* & \Omega L_M \end{bmatrix}\begin{bmatrix} d\underline{w} \\ dL_M \\ d\bar{w}^* \end{bmatrix} = \begin{bmatrix} -1-\Psi\underline{w} \\ \Theta_L \\ -\Omega\underline{w} \end{bmatrix} dL_D + \begin{bmatrix} 0 \\ 1 \\ \Phi \end{bmatrix} dw^* + \begin{bmatrix} 0 \\ 0 \\ -(\alpha / w^*)\Phi \end{bmatrix} d\alpha + \begin{bmatrix} 0 \\ \Theta_g \\ 0 \end{bmatrix} dg \quad , \tag{10}$$

where $\Psi = \dfrac{2}{3\beta(L_D + L_M)} > 0$, $\Omega = \dfrac{4(2w - \omega - \gamma)}{9\beta(L_D + L_M)} = -\dfrac{4}{3} < 0$, and $\Phi = \dfrac{-2(2AE - DB)(p_x - w^*/\alpha)}{\alpha(4AE - DB)} < 0$.

The determinant of the LHS matrix, Δ, is

$$\Delta = L_D\Omega < 0 . \tag{11}$$

3.1. *An increase in domestic workers*

There is a possibility that the total number of domestic workers increases due to a population growth or labour inflow from other industries. We obtain the following:

$$\frac{d\underline{w}}{dL_D} \gtreqless 0, \frac{dL_M}{dL_D} < 0, \frac{d\bar{w}^*}{dL_D} < 0 . \tag{12}$$

The implications of the above results are as follows. Since the profit of firm X in case of FDI, π_X^F does not change, the profit of firm X in case of exportation, π_X^D cannot

change to satisfy (9'), and neither can the total output x. Therefore, the role of both types of workers, domestic and foreign legal, is substitutional in production and, thus, an increase in employed domestic workers will lead to a reduction in the total number of necessary foreign workers. This will increase the possibility of detection, θ, the result of which will be that a smaller wage premium is sufficient; namely, $\overline{w}^*$ should decrease. However, the effect on the domestic minimum wage rate, $\underline{w}$, is not clear because even π_X^D is constant, and $\underline{w}$ may or may not increase to satisfy (6) and (7).

3.2. *An increase in the foreign wage rate*

We have implicitly assumed that the labor market in a foreign country is competitive. We have also assumed that the chocolate manufacturing industry occupies a sufficiently small part of the economy; thus, we have considered the foreign wage rate as constant, regardless of firm X's behaviour. Now, we consider the case of an increase in the foreign wage rate, w^*, due to the economic growth, namely capital accumulation of country 3. We also obtain

$$\frac{d\underline{w}}{dw^*} \gtreqless 0, \frac{dL_M}{dw^*} < 0, \frac{d\overline{w}^*}{dw^*} \gtreqless 0 . \tag{13}$$

The implication of this result is easy to understand. An increase in w^* means that the profit of firm X in case of FDI, π_X^F, decreases, which means that firm X's profit in case of exportation, π_X^D, must decrease to satisfy (9'). Equation (6) implies that w must increase and (5) implies that L_M must decrease. It can be observed from (2) that this also reduces optimal production, x. Increasing w^* might enhance $\overline{w}^*$, obtained from (1), but a decreased L_M should enhance θ, which, on the other hand, might reduce $\overline{w}^*$. Therefore, the effect on $\overline{w}^*$ is unclear. In addition, as observed in (7), we cannot determine the clear effect on $\underline{w}$ because of the unclear effect on $\overline{w}^* L_M$.

3.3. *An increase in production technology in country 3*

Next, we consider the case of a technology spillover that causes an increase in the production technology of country 3. In this case, α increases. We also have

$$\frac{d\underline{w}}{d\alpha} \gtrless 0, \frac{dL_M}{d\alpha} > 0, \frac{d\overline{w}^*}{d\alpha} > 0. \tag{14}$$

The increased production of foreign technology might increase the profit of firm X in case of FDI, π_X^F. Thus the profit in case of exportation, π_X^D must increase at the same rate to satisfy (9'). Contrary to the former case, a smaller w, a larger x, and a larger

L_M are required. Directly from (1), we obtain the relationship that $\overline{w}^*$ should increase. Finally, we have no clear result on $\underline{w}$.

3.4. *An increase in the profit of shirking*

The effects on endogenous variables by an increase in g are as follows:

$$\frac{d\underline{w}}{dg} < 0, \frac{dL_M}{dg} = 0, \frac{d\overline{w}^*}{dg} > 0 . \tag{15}$$

An increase in g will directly enhance $\overline{w}^*$, as obtained from (1). π_X^D must remain unchanged, from (9'), which, in turn, requires a constant w. Thus, from (5), L_M should remain constant. From (7), we also obtain that $\underline{w}$ should decrease.

Now, we establish the following proposition.

Proposition 1

1) The minimum wage rate for domestic workers in equilibrium will decrease in the case of an increasing profit of shirking.

2) Total number of legal foreign workers will increase in the case of a decrease in the number of exogenous domestic workers and in the wage rate of country 3. It will also

increase if foreign technology improves.

3) The efficiency wage rate of foreign workers will increase in the cases of an increase in the number of exogenous domestic workers, in foreign technology, and in the profit of shirking.

For the government of country 1, the first political objective is to prevent the hollowing of industry. Therefore, in order to maintain the domestic production of firm X, the government searches for and selects a level of the maximum wage rate. The second best objective for the government should be greater economic welfare of its citizens. As an aside, the effects of a change in exogenous variables on the profit of firm X, π_X^D, and on the per capita income of a domestic worker employed by firm X, $\underline{w}$, usually have different signs as shown in Proposition 1. The only exception is a decrease in the profit of shirking, g. This enhances $\underline{w}$ while π_X^D remains constant. The implication of a small merit of successful shirking is that foreign legal workers are paid reasonably well in correspondence to their duty; thus, they are relatively satisfied with their working conditions. Therefore, even though they earnestly engage in their daily job, their welfare level is relatively large. In this case, their welfare gain from successful shirking should be small. Therefore, the government of country 1 must establish a more

reasonable efficiency wage system for foreign legal workers. For example, the government should encourage a firm to introduce more comfortable working conditions, such as installing an air conditioning system or implementing welfare facilities, even though those do not directly alter workers' productivity under our assumptions. Now, we obtain the following proposition.

Proposition 2

A more reasonable efficiency wage system for foreign legal workers including a smaller profit of successful shirking could yield economic gain for the developed country, which intends to prevent hollowing out.

4. The case of an exogenous number of foreign legal workers

Let us consider another case where country 1 concludes EPA with country 3 and the number of legal foreign workers is exogenously given and fixed. In this case, firm X must employ all of those foreign workers; in turn, the number of domestic workers is endogenously given and is directly related to the total output.

Now, instead of (10), we obtain

$$\begin{bmatrix} \Psi L_D & 1+\Psi \underline{w} & \Psi L_M \\ 0 & -\Theta_L & 1 \\ \Omega L_D & \Omega \underline{w} & \Omega L_M \end{bmatrix} \begin{bmatrix} d\underline{w} \\ dL_D \\ d\bar{w}^* \end{bmatrix} = \begin{bmatrix} -1-\Psi \bar{w}^* \\ -\Theta_L \\ -\Omega \bar{w}^* \end{bmatrix} dL_M + \begin{bmatrix} 0 \\ 1 \\ \Phi \end{bmatrix} dw^* + \begin{bmatrix} 0 \\ 0 \\ -(\alpha / w^*)\Phi \end{bmatrix} d\alpha + \begin{bmatrix} 0 \\ \Theta_g \\ 0 \end{bmatrix} dg \quad , \tag{10'}$$

where the determinant of the matrix of LSD of (10'), Δ', is

$$\Delta' = \Omega L_D < 0 . \tag{11'}$$

4.1. *An increase in the number of foreign workers*

Let us assume that after the renewal of EPA, country 1 begins introducing more legal foreign workers than before. We obtain

$$\frac{d\underline{w}}{dL_M} \gtreqless 0, \frac{dL_D}{dL_M} < 0, \frac{d\bar{w}^*}{dL_M} > 0 , \tag{16}$$

and those results are similar to those obtained in the case of 3-1.

4.2. *An increase in the foreign wage rate*

An increase in the foreign wage rate causes different results in this case. We have

$$\frac{d\underline{w}}{dw^*} \gtreqless 0, \frac{dL_D}{dw^*} < 0, \frac{d\overline{w}^*}{dw^*} > 0. \quad (17)$$

First, from (9'), an increase in w^* means a decrease in the profit of firm X in case of FDI, π_X^F, which means that firm X's profit in case of exportation, π_X^D, must decrease to satisfy (9'). Equation (6) implies that w must increase, and (5) also implies that L_D must decrease. As observed in (2), this also reduces the optimal production, x. Increasing w^* might enhance $\overline{w}^*$, from (1), and a decreased L_D would reduce θ, which might also enhance $\overline{w}^*$. Therefore, in contrast to the case of 3-2, the effect on $\overline{w}^*$ is clearly positive. Furthermore, (7) does not indicate a clear effect on $\underline{w}$.

4.3. *An increase in production technology in country 3*

An increase in production technology in country 3 also yields completely different results. We have

$$\frac{d\underline{w}}{d\alpha} \gtreqless 0, \frac{dL_D}{d\alpha} > 0, \frac{d\overline{w}^*}{d\alpha} < 0. \quad (18)$$

The increased foreign technology might increase the profit of firm X in case of FDI, π_X^F.

Thus, π_X^D must increase at the same rate to satisfy (9'). This requires a smaller w, a larger x, and a larger L_D. Directly from (1), we obtain the relationship where $\overline{w}^*$ should decrease. Finally, from (7), we have no clear result on $\underline{w}$.

4.4. *An increase in the profit of shirking*

The effects on endogenous variables by an increase in g are exactly the same as those in the case of 3-4. We have

$$\frac{d\underline{w}}{dg} < 0, \frac{dL_D}{dg} = 0, \frac{d\overline{w}^*}{dg} > 0. \tag{19}$$

Now, we can assert the following proposition.

Proposition 3

1) The minimum wage rate for domestic workers in equilibrium will decrease in the case of an increase in the profit of shirking.

2) The total number of employed domestic workers will increase in the case of a decrease in the number of exogenous foreign legal workers and in the wage rate of country 3. It will also increase if foreign technology improves.

3) The efficiency wage rate of foreign workers will increase in the case of an increase in the number of exogenous foreign workers, in the wage rate of country 3, and in the profit of shirking. It will also decrease in the case of an increase in production technology in country 3.

In this case, once again, the first objective of the government of country 1 is to prevent the FDI of firm X. Second, it tries to enhance both the profit of firm X and the welfare of domestic workers. In contrast to the former case, not all of the domestic workers are unemployed; thus, the government must consider enlarging the total income of employed workers, $\underline{w}L_D$. Similar to the former case, a more reasonable efficiency wage system is also beneficial for this policy target. Moreover, if θ' is sufficiently large to satisfy

$$\theta' > \frac{3\beta(L_D + L_M)}{2L_M},$$

we have $d(\underline{w}L_D)/d\alpha > 0$ and can conclude that technology spillover to the developing country might also be beneficial for the developed country. Now, we obtain the following proposition.

Proposition 4

In the case of an EPA with fixed foreign legal workers, under certain conditions, a more reasonable efficiency wage system for foreign legal workers as well as technology spillover to the developing foreign country could cause economic gain for the developed country, which intends to prevent hollowing of industry.

5. Concluding Remarks

We assumed that the political objective of the developed country's government is to maintain the domestic production of a domestic firm so as to prevent the hollowing of industry. We also consider several real aspects of a modern economy, for example, population decrease, legal minimum wage rate, efficiency wage rate, and EPA including introducing a fixed number of legal foreign workers and imperfect competition in the Cournot and Bertrand fashion. We obtain that a stricter efficiency wage system should benefit the developed country's economy, and that under certain conditions of EPA, technological spillover could also enable the developed country to increase economic welfare.

Some topics remain for future research. First, we consider only the economic welfare

of country 1's native residents. However, it may be useful to consider the effects on global welfare, including legal immigrants. Second, we ignore the compensation policy by the government of country 1 to those who would be fired because of FDI. Equation (9) could be rewritten if we assume that the government guarantees several parts of the income of unemployed workers. Third, to simplify our analysis and reach a clearer conclusion, we assume that $\theta = \theta(L_D - L_M)$; however, it might be more reasonable to formulate that $\theta = \theta(L_D / L_M)$ or $\overline{w}^* = w^* + g/\theta$, like Milgrom and Roberts (1992).

Endnotes

[1] For example, Mie Prefecture and Kameyama city paid 13,500 million yen (approximately 122 million dollars) to invite the construction of a factory of SHARP, one of Japan's established electronics companies. With this local government budget expenditure, SHARP decided to locate its liquid crystal TV factory in Kameyama, Mie, rather than in China.

[2] Milgrom and Roberts (1992) simplified Shapiro and Stiglitz (1984) and expressed the efficiency wage rate as $\overline{w}^* = w^* + g/\theta$. In this study, their formation is slightly changed for the convenience of calculation.

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