

# Globalization and Economic Welfare under the Irregular Employment of Domestic Workers

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By focusing on the unfair disparity between skilled workers of uniform quality, where unionized older workers are employed permanently with higher wages, but younger workers fail to occupy permanent positions and are employed as uncertain temporary irregular staff on lower wages, we investigate the effects of the two types of globalization caused by the increasing immigration of foreign unskilled workers and trade liberalization. Under certain conditions, the immigration of unskilled workers might expand the income gap between the two types of skilled workers, but it would have a positive effect on national welfare. Thus, with adequate income re-distribution policies by the government, immigration could be a welfare-improving policy. In contrast, although trade liberalization may reduce the wage gap between the two types of skilled workers, every worker may lose out, and the welfare-improving possibility of trade liberalization is limited.

## I. Introduction

As a result of low economic growth in the recent decades, firms in developed countries that confront uncertainty in their future tend to hesitate to employ workers on a permanent basis. Thus, it has gradually become increasingly difficult for young workers, who have just graduated from a college or a university and have sufficient potential quality to be skilled workers, to find suitable job opportunities. They aspire to be permanent employees, but many new graduates fail to find permanent positions. In such a situation, a number of young workers are employed by staff agencies that supply workers to companies on a temporary basis. Usually, the wages of these temporary workers are very low and

almost equal to the legal minimum wage. Moreover, these workers face the possibility of unemployment because the contract of temporary staff can be terminated easily and frequently. Therefore, by following the wage arbitrage, some workers, rather than taking up temporary assignments, choose to be employed as unskilled workers with very low competitive wages.

As the educational backgrounds of these temporary staff are the same as those of the regular staff, there is no difference in productivity between them. However, despite the fact that there is no quality difference between them, there exists a serious gap among highly educated workers. While the younger generations suffer, the older generations not only occupy permanent positions but

they are also sometimes unionized and through negotiation, they acquire a certain share of the profits by firms that are under oligopolistic competition.

The prevailing economic trend is globalization, and several kinds of ETAs and EPAs have been agreed upon between countries. Thus, there is not only free trade of goods and services but also free labor mobility between countries, which implies introducing unskilled foreign workers into the mainstream global economy. The main focus of our study is to investigate the economic effects of globalization on the existence of the unfair gap between the two types of skilled workers.

Despite the important effect of labor market imperfections on the issue of immigration, theoretical studies on the subject have been limited. Schmidt et al. (1994) and Fuest and Thum (2001) have analyzed immigration in unionized markets by focusing on skill differences. They demonstrate that immigration can be beneficial to the host country owing to the complementarity of unskilled immigrants to skilled natives. Fuest and Thum (2000) show that immigration enhances welfare if the wage elasticity of labor demand in the competitive sector is smaller than that in the unionized sector. Our study is based on the study by Zhao and Kondoh (2007), which analyzes the economic effects of globalization under unionization. Some workers in the

manufacturing industry are unionized, and they obtain a wage premium, but the other workers are non-unionized and gain only a competitive wage. By adopting a similar approach to the one taken by Harris and Todaro (1970), we extend the study of Zhao and Kondoh (2007), which does not consider the recent unfair gap between generations, the possible unemployment of temporary staff, and the outflow of skilled workers to the unskilled labor market<sup>1)</sup>. Our findings about the effects of globalization differ from Zhao and Kondoh (2007) in some ways (for instance, the possibility of welfare improving the situation through trade liberalization). We suggest that immigration could be acceptable with an adequate income-redistribution policy; however, in the case of a poor income re-distribution policy, trade liberalization might be better for the dissolution of the unfair gap.

In Section 2, we present our model. Section 3 is devoted to the analysis. Concluding remarks are presented in Section 4.

## II. The Model

### 1. Consumers

By adopting a similar approach to the one taken by Zhao and Kondoh (2007), let us consider a host-country economy consisting of the following two industries: service industry ( $x$ ) and manufacturing

industry ( $y$ ), with  $y$  as the numeraire good. While perfect competition prevails in the manufacturing industry, the service industry is characterized by Cournot-Nash competition of a fixed number of  $n$  firms. We assume that a typical consumer maximizes the following homothetic utility function,  $\mu = c_x^\alpha c_y^{1-\alpha}$ , where  $c_x$  and  $c_y$  are respectively the domestic consumption of goods  $x$  and  $y$ , and  $\alpha$  is a positive constant. Utility maximization subject to the standard budget constraint yields the following inverse demand function,

$$p(c_x, c_y) = \frac{\alpha}{(1-\alpha)} \frac{c_y}{c_x}. \quad (1)$$

By following the economy of Japan, which has a surplus of trade and deficit of service, we assume that the host country is import competing in service; that is, it imports good  $x$  and exports good  $y$ . This country is small and takes the world price as given. However, it imposes a quota,  $q$ , on foreign imports. The justification for this assumption might be that under the WTO system, while tariffs are on the decline, non-tariff barriers still exist in various forms, especially in service trade, limiting trade flows. In order to maintain a balanced trade, we must also have  $c_x = x + q$ ,  $c_y = y - p^*q$ , where  $x$  and  $y$  respectively denote the total outputs of service and manufacturing produced in the host country, and  $p^*$  is the world price<sup>2)</sup>.

## 2. Manufacturing Industry

In the manufacturing industry, the production of good  $y$  uses unskilled labor and capital:  $y = y(L_y, K)$ , where  $y$  is output, and  $L_y$  and  $K$  are the inputs of unskilled labor and capital respectively. We assume that perfect competition prevails in this industry, such that labor is hired until the marginal product of labor is equal to the competitive wage:

$$w^* = y_1(L_y, K). \quad (2)$$

Although some exporting manufacturing industries in Japan are characterized by oligopolistic competition, such as the car industry, we here focus on small firms that are sub-contracted by large firms. Owing to the keen competition with similar domestic and foreign firms and the discounted payment usually enforced by the parent companies, the small firms in this industry cannot afford to observe the legal criteria. This is why we permit that the competitive wage of this sector  $w^*$  could be lower than the legal minimum wage  $\underline{w}$  informally. Moreover, we also assume that foreign unskilled workers are employed in this industry. In reality, workers who cannot communicate with domestic people very well tend to be employed by the manufacturing industry, and such workers are not employed by the service industry.

## 3. Service Industry

We assume that the workers employed in

the service industry of our model are relatively skilled workers with regard to communication skills, and they have a bachelor's degree. In Japan, almost one-third of the domestic workers are employed as temporary staff. In particular, more than 60% of the workers serving in restaurants or hotels are not permanent employees. Around 45% of the salespersons in the wholesale or retail sectors are also part time employees. The reasonable examples of the  $x$  industry, in which some unionized permanent employees and some temporary staffs are both employed, are the IT industry and financial industry. In the telecommunication service industry, capital concentration has already widely proceeded and now the market of mobile phone service is just under oligopoly by three major companies, NTT-Docomo, KDDI, and Softbank. Concerning with internet contents, foreign global companies like amazon, apple and google spread into Japanese market and compete with Japanese companies like Rakuten. In several fields of this industry, Japanese government has maintained regulations of foreign investments but steadily opening the markets<sup>3)</sup>. Similarly, capital concentrations of global banks and insurance companies of Japan have already finished and there also exist a certain number of foreign-owned financial institutions in Japanese market. In both cases, we can observe net import of those services and

imperfect competition.

Similar to Zhao and Kondoh (2007), we characterize this industry by oligopoly. Each firm is identical and employed workers are partially unionized. Unionized workers are employed regularly and the employment and wage rate of unionized workers are determined by negotiation. On the other hand, non-unionized workers are employed irregularly by the legal minimum wage rate and confront the probability of being fired in every period. The production of good (service)  $x$  uses labor only in a one-to-one ratio by a proper choice of units:  $x = n(L_1 + L_0)$ , where  $x$  is the output,  $L_1$  is the labor input of unionized sector, and  $L_0$  is the labor input of non-unionized sector,  $n$  is the number of firms, respectively. We need to note that there is no difference in the productivity between workers.

The aggregate profit function of a unionized sector of a typical firm is:

$$\pi_1 = (p - w)L_1, \quad (3)$$

where  $w$  is the wage paid to union members. In a unionized sector, all the domestic workers join in the union.

A typical union has a Stone-Geary type utility function<sup>4)</sup>:

$$u(w, L_1) = (w - \underline{w})L_1^\beta. \quad (4)$$

It is interested in employment as well as a union wage premium above the legal minimum wage, and  $\beta$  is the parameter which shows the union preference.  $\beta > (<) 1$  implies that unions prefer employment to wage (wage to employment).

Wage and employment in unionized sector are determined through negotiations. The solution concept we adopt is Nash bargaining. The union and the firm jointly choose employment and wage to maximize the following Nash product:  $G(L_u, w) = \pi_1 u^\gamma$ , where  $\gamma$  denotes the negotiation power between the union and firm.  $\gamma > (<) 1$  implies that the power of the union (firm) dominates that of firm (union). The equilibrium satisfies the following conditions:

$$(p - w)(1 + \beta\gamma) + L_1 p_1 = 0, \quad (5a)$$

$$\gamma(p - w)(w - \underline{w}) = 0. \quad (5b)$$

After negotiation, this firm employs temporary (irregular) workers who are alienated from union power. A non-unionized workers register with temporary staffing agencies. The labor contracts of such workers are renewed periodically, and whether or not the worker will continue to be employed in the next period depends on random probability. The firm pays the legal minimum wage  $\underline{w}$  to the temporary staff and maximizes profits:

$$\pi_0 = (p - \underline{w})L_0. \quad (6)$$

The number of temporary workers is determined by the firm so as to maximize total profit:

$$\pi = \pi_0 + \pi_1.$$

which results in the following FOC<sup>5)</sup>:

$$\underline{w} = p + p_1 L_0. \quad (7)$$

The labor contract of a worker with a non-unionized sector is temporary. Let us

assume that it is renewed in each period, and whether the worker will continue to be employed in the next period or not depends on random probability. The total number of workers who register with temporary staffing agencies is the sum of workers employed by a non-unionized sector, and unemployed workers who are just waiting for the next opportunity to be hired. Domestic workers can move between the two sectors freely. Thus, in equilibrium, the expected income of a worker who registers with temporary staffing agencies should be equal to the income of workers in the competitive sector  $y$ :

$$w^* = \frac{L_0}{L_0 + L_u} w, \quad (8)$$

where  $L_u$  denotes the number of unemployed workers who register with temporary staffing agencies.

Finally, there is full employment and full mobility of labor which satisfies the following condition:

$$n(L_1 + L_0 + L_u) + L_y = \bar{L}, \quad (9)$$

where  $\bar{L}$  is the labor endowment.

If we substitute (1) into (7), (5a) and (5b), and substitute (2) into (8), we have five equations that determine the endogenous variables,  $L_y$ ,  $L_0$ ,  $L_1$ ,  $L_u$ , and  $w$ . This completes the basic model set up.

### III. The Analysis

#### 1. International Immigration

Let us first investigate the case of

international immigration. In recent times, the majority of immigrants to developed countries such as Japan are unskilled workers who have poor communication skills, and some of them are illegal immigrants. By considering this situation, we assume that immigrants cannot be employed by unionized sector of service industry. Let  $L_M$  denote the total number of immigrants. Under permanent immigration, using (8), condition (9) becomes

$$n(L_1 + L_0 + L_u) + L_y = \bar{L} + L_M, \quad (9)$$

where we assume  $L_M < L_y$ . By total differentiation, we derive the following comparative statistical results (see Appendix for detailed calculations) under the condition  $\beta\gamma^2 < 1$ :  $dw/dL_M > 0$ ,  $dL_1/dL_M > 0$  (if  $\beta > 1$ ),  $dL_0/dL_M > 0$ ,  $dL_u/dL_M > 0$ , and  $dL_y/dL_M > 0$ . Both conditions,  $\beta > 1$  and  $\beta\gamma^2 \leq 1$ , could be satisfied under the following numerical example:  $(\beta, \gamma) = (2, 0.6)$ , which implies that labor unions prefer employment to wage, and the negotiating power of the union is less than that of the firm. The utility of unionized workers will surely increase with international immigration because of increasing employment,  $L_1$  and wage rate,  $w$ . In contrast, the wage rate paid to the workers in the manufacturing sector and the expected wage rate of temporary staff in the non-unionized service sector,  $w^*$ , will decrease because of increasing  $L_y$ . Therefore, regardless of the change in the relative price of two goods,  $p$ , the

income gap between the two types of workers, the high-income unionized workers and the low-income workers, will increase after the introduction of foreign unskilled workers. Moreover, the income of capital owners in the manufacturing industry and the profits of unionized and non-unionized firms will also increase.

In terms of economic welfare, let us define the indirect utility function as  $v \equiv v(p, I)$ , where  $I = px + y - w^*L_M$  is the national income. The total differentiation yields  $-v_1/v_2 = c_x$ , using (1) and the trade balance condition. Further, we derive

$$\begin{aligned} \frac{dv}{dL_M} &= \frac{v_1 dp}{dL_M} \\ &+ v_2 \left( \frac{c_x dp}{dL_M} + \frac{p dx}{dL_M} + \frac{dy}{dL_M} - \frac{L_M dw^*}{dL_M} - w^* \right) \\ &= v_2 \left( \frac{p dx}{dL_M} - L_M y_{11} \right) > 0, \end{aligned} \quad (10)$$

where we apply  $w^* = dy/dL_M$ . International immigration could improve the welfare of the host country. Thus, if the government adopts effective income distribution policies and compensates the wage loss of low-income workers by imposing a tax on the income of unionized workers, capital owners, and unionized sector, the residents of this country could welcome the expansion of the immigration policy.

Now, we can assert the following proposition:

**Proposition 1**

1) Consider that labor unions prefer

employment to wages, and the negotiation power of the union is less than that of the firm to satisfy conditions,  $\beta > 1$  and  $\beta\gamma^2 \leq 1$ . Accordingly, an increase in immigration raises the union wage but reduces the competitive wage and the expected wage of the temporary staff. It also increases the utility of the union, the profits of the monopoly firm, and the rental of capital owners.

2) *Immigration raises national welfare.*

## 2. Trade Liberalization

Further, we examine the effect of trade liberalization. Appendix shows that  $dw/dq < 0$ ,  $dL_1/dq < 0$ ,  $dL_0/dq > 0$ ,  $dL_u/dq > 0$ , and  $dL_y/dq > 0$  ( $dw^*/dq < 0$ ). On the basis of these factors, the union welfare will decline because of the reduced wage rate and employment. The non-unionized workers will also lose from globalization because the (expected) wage for them,  $w^*$ , will decrease. Furthermore, on the basis of (5b), unionized sector of the firm always share the realized profits by  $\gamma:1$ . It subsequently follows that an increase in  $q$  also reduces the profits of the unionized firms. Capital owners in the manufacturing sector are the only ones who gain. The total output of manufacturing,  $y$ , will surely increase and that of service,  $x$ , will also increase if we assume  $\beta > 1$  and  $L_1 \leq (1+\gamma)L_0$ . In accordance with the former sub-section, whether economic welfare will increase or decrease depends

on the change of outputs of both sectors as shown in (11).

$$\begin{aligned} \frac{dv}{dq} &= v_2 \left( \frac{pdx}{dq} + \frac{dy}{dq} - \frac{dw^*}{dL_y} \frac{dL_u}{dq} L_M \right) \\ &= v_2 \left[ \frac{p(dL_0 + dL_1)}{dq} + (y_1 - L_M y_{11}) \frac{dL_y}{dq} \right] \end{aligned} \quad (11)$$

Thus we can assert the possibility that economic welfare will increase after trade liberalization (increasing quota) in case that unions prefer employment to wage premium and total number of unionized workers are less than that of non-unionized.

The above results lead to the following proposition.

### Proposition 2

1) *Trade liberalization in the form of an increase in the import quota reduces the income of every worker. Employment by the unionized sector, the union utility, and the profit of the unionized sector will also decrease.*

2) *Welfare-improving possibility by trade liberalization is limited.*

## IV. Concluding Remarks

We extend the Zhao and Kondoh (2007) model by focusing on the unfair gap between the skilled workers of uniform quality, that is, between the unionized older workers employed permanently and young temporary staff with lower wages. In particular, we investigate the economic effects of the trend of globalization

caused by the increasing immigration of foreign unskilled workers and trade liberalization. Under certain conditions, the immigration of unskilled workers might expand the income gap between the two types of skilled workers, but it would have a positive effect on the national welfare. Thus, with adequate income redistribution policies by the government, everybody could benefit through the introduction of foreign unskilled workers. In contrast, trade liberalization reduces the expected wage of every worker, but the income gap between the two types of skilled workers may decrease. The possibility that trade liberalization may have a positive effect on the national welfare is limited.

The above results depend on the straightforward setting of our model. The consideration of other situations, such as the opposite trade pattern, the immigration of skilled workers, and the temporary immigration of unskilled workers, are subjects for future examination<sup>6)</sup>.

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**Appendix**

Totally differentiating (7b), (7a), (4), (9') and (8), using inverse demand (1), yields the following matrix.

$$\begin{bmatrix} -(1+\gamma) & \gamma p_1 & \gamma p_1 & 0 & \gamma p_2 \\ -(1+\beta\gamma) & p_1+A & A & 0 & B \\ 0 & C & p_1+C & 0 & D \\ 0 & 1 & 1 & 1 & \frac{1}{n} \\ 0 & 0 & \frac{L_u}{(L_0+L_u)^2} & -\frac{wL_0}{(L_0+L_u)^2} & -y_{11} \end{bmatrix} \begin{bmatrix} dw \\ dL_1 \\ dL_0 \\ dL_u \\ dL_y \end{bmatrix} = \begin{bmatrix} -1 \\ 0 \\ 1 \\ 0 \\ -\frac{L_0}{L_0+L_u} \end{bmatrix} d\bar{w} + \begin{bmatrix} -\gamma p_3 \\ E \\ F \\ 0 \\ 0 \end{bmatrix} dq + \begin{bmatrix} 0 \\ 0 \\ 0 \\ \frac{1}{n} \\ 0 \end{bmatrix} dL_M. \quad (A1)$$

where  $A = p_{11}L_1 + (1+\beta\gamma)p_1$

$$= p \left[ \frac{L_1 - (1+\beta\gamma)(x+q)}{(x+q)^2} \right] < 0,$$

$B = y_1 [p_{12}L_1 + (1+\beta\gamma)p_2]$

$$= -py_1 \left[ \frac{L_1 - (1+\beta\gamma)(x+q)}{(x+q)(y-p^*q)} \right] > 0,$$

$C = p_1 + p_{11}L_0 = -p \left[ \frac{(x+q-L_0)}{(x+q)^2} \right] < 0,$

$D = y_1 [p_2 + p_{12}L_0] = py_1 \left[ \frac{(x+q-L_0)}{(x+q)(y-p^*q)} \right] > 0,$

$E = -[p_{13}L_1 + (1+\beta\gamma)p_3]$

$$= p \left[ \frac{(1+\beta\gamma)(x+q) - L_1}{x+q} \right] \left[ \frac{1}{(x+q)} + \frac{p^*}{y-p^*q} \right] > 0,$$

and

$F = -[p_{13}L_0 + p_3]$

$$= p \left[ \frac{x+q-L_0}{x+q} \right] \left[ \frac{1}{(x+q)} + \frac{p^*}{y-p^*q} \right] > 0.$$

The determinant of the LHS matrix of (A1) is,

$$\Delta = \left[ \frac{wL_0}{n(L_0+L_u)^2} - y_{11} \right] [(\beta\gamma^2 - 1)p_1^2$$



$$-(1+\gamma)(A+C)p_1] - \frac{L_u}{(L_0+L_u)^2}[(\beta\gamma^2-1)p_1D - F\gamma p_{12}L_1[\frac{wL_0+L_u}{(L_0+L_u)^2}]] < 0, \quad (\text{A8})$$

$$-(1+\beta\gamma)\gamma p_2C] + \frac{wL_0}{(L_0+L_u)^2}[(1+\gamma)p_1(B+D) - (1+\beta\gamma)\gamma p_1p_2].$$

$$\frac{dL_0}{dq} = \Delta^{-1}\{(1+\gamma)p_1F[\frac{wL_0}{n(L_0+L_1)^2} - y_{11}] + F\gamma p_{12}L_1[\frac{wL_0}{(L_0+L_u)^2}]\} > 0, \quad (\text{A9})$$

The sign of  $\Delta$  is negative if  $\beta^2\gamma \leq 1$  which exclude the unrealistic case that satisfy both the following two conditions; union does not prefer wage premium of themselves to introducing new union members and the negotiation power of unionized firm is relatively weaker than that of union.

Straightforward calculations yield:

$$\frac{dw}{dL_M} = \frac{\Delta^{-1}}{n} \left[ -\frac{wL_0}{(L_0+L_u)^2} \gamma p y_1 p_1 \{ p[L_1+L_0 - (2+\beta\gamma)(x+q)] + p y_1 [L_1+L_0 - (x+q)(3+\beta)] \} \right] > 0, \quad (\text{A2})$$

$$\frac{dL_1}{dL_M} = \frac{\Delta^{-1}}{n} \left[ \frac{wL_0}{(L_0+L_u)^2} \left\{ \frac{-p^2[(1+\beta\gamma)(x+q) - (1+\gamma)L_1]}{(x+q)^2(y-p^*q)} \right\} \right] > 0$$

if  $\beta > 1$ , (A3)

$$\frac{dL_0}{dL_M} = \frac{\Delta^{-1}}{n} \frac{wL_0}{(L_0+L_u)^2} (1+\gamma)p_1D > 0, \quad (\text{A4})$$

$$\frac{dL_u}{dL_M} = \frac{\Delta^{-1}}{n} \{ -y_{11}[(\beta\gamma^2-1)p_1^2 - (A+C)(1+\gamma)p_1] - \frac{L_u}{(L_0+L_u)^2} [(\beta\gamma^2-1)p_1D - (1+\beta\gamma)\gamma p_2C] \} > 0$$

if  $\beta\gamma^2 \leq 1$ , (A5)

$$\frac{dL_u}{dL_M} = \frac{\Delta^{-1}}{n} \left[ \frac{wL_0}{(L_0+L_u)^2} \{ p_1^2(\beta\gamma^2-1) - (1+\gamma)p_1(A+C) \} \right] > 0 \quad \text{if } \beta\gamma^2 \leq 1, \quad (\text{A6})$$

$$\frac{dw}{dq} = \Delta^{-1} \{ -\gamma p_2^2 p_3 \left[ \frac{wL_0}{n(L_0+L_1)^2} - y_{11} \right] \} < 0, \quad (\text{A7})$$

$$\frac{dL_1}{dq} = \Delta^{-1} \{ -p_1E \left[ \frac{wL_0}{n(L_0+L_1)^2} - y_{11} \right] \}$$

$$\frac{dL_0}{dq} = \Delta^{-1} \{ F[(1+\gamma)p_1 + \gamma A - (1+\beta\gamma)] \frac{L_u}{(L_0+L_u)^2} + p_1[E + (1+\gamma)F] \left[ \frac{wL_0}{(L_0+L_u)^2} \right] \} > 0. \quad (\text{A10})$$

From(8), (A8) and (A10), we also can conclude that  $dL_u/dq > 0$ .

## Notes

- 1) Similar to Djajic (1986), Kondoh (1999) and Chao and Yu (2002), Zhao and Kondoh (2007) focus on the difference between two types of immigrants; permanent immigrants without remittance and temporary immigrants with remittance.
- 2) Equation (1) can be expressed as  $p = p(L_1, L_0, L_y, q)$  where  $p_1 = \partial p / \partial L_1 = \partial p / \partial L_0 = -p/(x+q) < 0$ ,  $p_2 = \partial p / \partial L_2 = p y_1 / (y - p^*q) > 0$ , and  $p_3 = \partial p / \partial q = -p[(1/x+q) + (p^*/y - p^*q)] < 0$ .
- 3) Before 1997, foreign shareholders of telecommunication service companies had to be less than one third of total. Now this regulation applies only to NTT. Still foreign shareholders of the broadcasting companies must be less than one fifth.
- 4) See Mezzetti and Dinopoulos (1991) and Zhao (2001).
- 5) It is noteworthy to mention that in reality the optimal policy for a firm of industry  $x$  is to employ irregular workers only because there is no difference between unionized and non-unionized workers in terms of productivity. What we are studying is the real case that from the beginning there exists labor

union and the possible option to employ temporary workers is introduced later. In that case, firms usually consider sub-optimal policies under the restriction of union existence.

6) We also can consider that industry  $x$  is advanced manufacturing while industry  $y$  is traditional manufacturing or agricultural (in the latter case  $K$  should be considered land). Then inverse trade pattern, exporting good  $x$  and importing good  $y$ , should be more reasonable but it does not cause any essential change in the main results of this study. Moreover, immigrants might be possibly employed by industry  $x$  while employment of foreign workers in agricultural industry looks extraordinary in Japan. The structure of the model need to be revised but under the assumption that immigrants are strictly alienated from labor union, it is indifferent for immigrants whether they are employed in the industry  $y$  or registered in non-unionized sector of industry  $x$ , because of no difference between these two options in terms of expected income.

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