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Emigration and wage inequality in a dual economy

Shigemi Yabuuchi
Aichi University

Abstract

We examine the effect of emigration of skilled and unskilled labor on pre-existing wage gap between the skilled-unskilled labor. The results by Marjit and Kar (2005) will be confirmed also in a dual economy setup.

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1. Introduction

There have been extensive studies on the effects of economic liberalization on the skilled-unskilled wage inequality. Recently, Marjit and Kar (2005) examined the effect of skilled and unskilled labor emigration on wage gap in the developing world by using a simple two good-three input specific-factor model like Jones (1971).[1] Their model differs from Jones (1971) in that labor is specific in the Marjit-Kar model while capital is specific in the original Jones' model. Their important result is that emigration of unskilled as well as skilled workers would increase (decrease) the wage gap if capital's income share in the skilled sector is larger (smaller) than that in the unskilled sector, in other words, if the skilled (unskilled) sector is capital intensive.

They assume that the economy is a developing country. Then, our first innovation in this note is that it introduces unemployment into the two-good-three input specific factor model. The justification for this stems from Marjit and Kar's (2005) paper where it is assumed that the economy is a developing economy. Thus incorporating unemployment into the model serves a useful purpose since unemployment is a characteristic feature of developing economies. This is achieved by the labor allocation mechanism in the model where the wage rate in the agricultural sector equals the wage rate in the manufacturing sector times the probability of finding a job in the manufacturing sector. This is based on the Harris-Todaro model where the wage rate in the manufacturing sector is relatively higher and more rigid than the agricultural sector's wages which are more flexible.

The second innovation in the present model is a direct extension of Marjit and Kar's (2005) model on the mobility of unskilled labor between the sectors. We extend the model so that unskilled labor is mobile between the sectors while both unskilled and skilled labor are specific in Marjit and Kar's model. This setup captures the real economy more accurately.

2. The model and assumptions

Let us consider a small open economy in which there are two sectors. One sector produces good 1, X_1, and the other sector produces good 2, X_2. For simplicity, we label sectors 1 and 2 as agricultural and manufacturing sectors, respectively. Production of good 1 requires unskilled-labor (L_1), and capital (K_1), while production of good 2 requires unskilled-labor (L_2), capital (K_2), and skilled-labor (H_2). Thus, the production functions are as follows:

$$X_1 = F^1(L_1, K_1), \qquad (1)$$
$$X_2 = F^2(L_2, K_2, H_2). \qquad (2)$$

It is assumed that F^j has positive and diminishing marginal products and it is homogeneous of degree one.

Under perfect competition, we have

$$p_1 = a_{L1}w_1 + a_{K1}r, \qquad (3)$$

[1] Other studies on wage inequality include Davis (1998), Feenstra and Hanson (1997, 2003), Jones and Marjit (2003), Kar and Beladi (2004), and Chaudhuri and Yabuuchi (2007), among others.

$$p_2 = a_{L2}w_2 + a_{K2}r + a_{H2}s\,, \tag{4}$$

where a_{ij} is the amount of the *i*th factor used in the *j*th industry to produce one unit of the output, w_j is the wage rate of unskilled labor in the *j*th sector, *s* is the wage rate of skilled labor, *r* is rental of capital, and p_j is the price of the *j*th good (j = 1,2). In order to simplify the analysis, we assume that sector 2 employs a constant amount of skilled labor to produce one unit of the output, i.e., a_{H2} is constant. We also assume that all goods are tradable and then their prices are exogenously given.

In the standard Harris-Todaro model (Harris and Todaro (1970)),[2] it is assumed that the wage rate in (manufacturing) sector 2 (w_2) is set at a relatively high level, and it is rigid due to some political and/or institutional considerations, while the wage rate in (agricultural) sector 1 (w_1) is flexible. In this situation, the rural workers have two alternatives of staying in rural areas in order to obtain a job at a low wage rate or migrating to urban areas in order to seek a high wage income at the risk of unemployment. Thus, the labor allocation mechanism between the sectors is shown as follows:

$$w_1 = w_2 L_2/(L_2 + L_u) \quad \text{or} \quad w_1(1+\lambda) = w_2\,, \tag{5}$$

where L_2 and L_u are the employed and unemployed labor in the urban area, respectively, and $\lambda = L_u / L_2$. In the labor market equilibrium, therefore, the wage rate in sector 1 (w_1) equals the expected wage income in sector 2, which equals the manufacturing wage rate (w_2) times the probability of finding a job in the urban manufacturing sector ($L_2/(L_2 + L_u)$).

Exogenously given endowments impose the following resource constraints:

$$a_{L1}X_1 + a_{L2}X_2 + \lambda a_{L2}X_2 = L + L^*, \tag{6}$$
$$a_{H2}X_2 = H + H^*, \tag{7}$$

and

$$a_{K1}X_1 + a_{K2}X_2 = K + K^*, \tag{8}$$

where *L*, *H*, and *K* are the domestic endowments of unskilled labor, skilled labor, and capital, respectively, while *L**, *H**, and *K** are the foreign inflows of unskilled labor, skilled labor, and capital, respectively. This completes the specification of our model with the fixed endowment of factors and the internationally determined prices. We have six unknown variables w_1, *s*, *r*, X_1, X_2, and λ, which are solved by six equations (3)–(8) for given parameters, w_2, p_1, p_2, *L*, *H*, *K*, *L**, *H**, and *K**.

[2] On the Harris-Todaro model and the extension, see Batra and Naqvi (1987), Beladi and Naqvi (1988), Beladi, Chaudhuri and Yabuuchi (2008), Chao and Yu (1996), Corden and Findlay (1975), Gupta (1993), Khan (1980), Neary (1981), Yabuuchi (2008) etc.

3.International factor movement and wage inequality

Let us now analyze the consequences of international mobility of different factors of production on the skilled-unskilled wage inequality. Differentiating (3) to (8), we obtain

$$\begin{bmatrix} 0 & \theta_{H2} & \theta_{K2} & 0 & 0 & 0 \\ \theta_{L1} & 0 & \theta_{K1} & 0 & 0 & 0 \\ \lambda_{L1}S_{LL}^{1} & 0 & A & (1+\lambda)\lambda_{L2} & \lambda_{L1} & \lambda\lambda_{L2} \\ 0 & 0 & 0 & 1 & 0 & 0 \\ \lambda_{K1}S_{KL}^{1} & 0 & B & \lambda_{K2} & \lambda_{K1} & 0 \\ (1+\lambda)w_1 & 0 & 0 & 0 & 0 & \lambda w_1 \end{bmatrix} \begin{bmatrix} \hat{w}_1 \\ \hat{s} \\ \hat{r} \\ \hat{X}_2 \\ \hat{X}_1 \\ \hat{\lambda} \end{bmatrix} = \begin{bmatrix} \hat{p}_2 \\ \hat{p}_1 \\ l^*\hat{L}^* \\ h^*\hat{H}^* \\ k^*\hat{K}^* \\ 0 \end{bmatrix} \tag{9}$$

where $l^* \equiv L^*/(L+L^*)$, $h^* \equiv H^*/(H+H^*)$, $k^* \equiv K^*/(K+K^*)$, λ_{ij} is the allocative share of factor *i* in the *j*th sector (e.g., $\lambda_{K1} = a_{K1}X_1/(K+K^*)$), θ_{ij} is the distributive share of factor *i* in the *j*th sector (e.g., $\theta_{H2} = sa_{H2}/p_2$), $A \equiv (1+\lambda)\lambda_{L2}S_{LK}^{2} + \lambda_{L1}S_{LK}^{1} > 0$, $B \equiv \lambda_{K2}S_{KK}^{2} + \lambda_{K1}S_{KK}^{1} < 0$ and $S_{KK}^{1} = (r/a_{K1})(\partial a_{K1}/\partial r)$ and so on.

Solving (9) for $\hat{w}_1$ and $\hat{s}$, we have

$$\hat{w}_1 = (w_1\lambda\theta_{K1}\theta_{H2}/\Delta)\{(l^*\lambda_{K1}\hat{L}^*) + (h^*\Lambda_{LK}\hat{H}^*) - (k^*\lambda_{L1}\hat{K}^*)\} \tag{10}$$

$$\hat{s} = (w_1\lambda\theta_{L1}\theta_{K2}/\Delta)\{(l^*\lambda_{K1}\hat{L}^*) + (h^*\Lambda_{LK}\hat{H}^*) - (k^*\lambda_{L1}\hat{K}^*)\} \tag{11}$$

where $\Lambda_{LK} = \lambda_{L1}\lambda_{K2} - \lambda_{K1}(1+\lambda)\lambda_{L2}$, and Δ is the value of the determinant of the coefficient matrix of the system,

$$\begin{aligned} \Delta = -\lambda w_1\lambda_{K1}\theta_{H2}[(1+\lambda)\lambda_{L2}(\theta_{K1} + \theta_{L1}S_{LK}^{2}) \\ + \lambda_{L1}\{(\theta_{L1}S_{LK}^{1} + \theta_{K1}S_{KL}^{1}) - \theta_{K1}S_{LL}^{1}\}] < 0 \end{aligned}.$$

Subtraction of (10) from (11) yields

$$(\hat{s} - \hat{w}_1) = (w_1\lambda\Theta/\Delta)\{(l^*\lambda_{K1}\hat{L}^*) + (h^*\Lambda_{LK}\hat{H}^*) - (k^*\lambda_{L1}\hat{K}^*)\} \tag{12}$$

where $\Theta = (\theta_{K2}\theta_{L1} - \theta_{K1}\theta_{H2})$. We suppose that the model satisfies the Khan-Neary stability condition, i.e., $\Lambda_{LK} = \lambda_{L1}\lambda_{K2} - \lambda_{K1}(1+\lambda)\lambda_{L2} > 0$. This leads to the following proposition.

Proposition 1. *Emigration (Immigration) of skilled or unskilled labor will increase (decrease) the wage inequality if sector 2 is capital intensive in the sense that* $\Theta = (\theta_{K2}\theta_{L1} - \theta_{K1}\theta_{H2}) > 0$.

Emigration of unskilled labor increases the wage rate (w_1). This causes the induced change in the wage rate of skilled labor (*s*). In order to examine the effect on *s*, we obtain by differentiating (3) and (4),

$$\theta_{L1}\hat{w}_1 + \theta_{K1}\hat{r} = 0 \tag{13}$$

$$\theta_{K2}\hat{r} + \theta_{H2}\hat{s} = 0 . \tag{14}$$

Thus, we have

$$\hat{s} = (\theta_{L1}\theta_{K2} / \theta_{H2}\theta_{K1})\hat{w}_1 . \tag{15}$$

Therefore, the skilled wage rate also increases due to the outflow of unskilled labor and induced increase in w_1 . The effect on the wage inequality depends on the relative magnitude of the changes in the wage rates, that is, on the factor intensity condition. The condition provided in Proposition 1 is formally the same as that derived by Marjit and Kar (2005) except that unskilled labor is used in both sectors in our model, so that it cannot be simplified in the form shown in their paper (i.e., $\theta_{K2} > \theta_{K1}$ in the present notations). However, this shows the robustness of the result of Marjit and Kar (2005).

Finally, let us make a brief remark on the effect of capital inflow on the wage inequality. It can be seen from (12) that capital inflow has exactly the opposite effect than the effects of the inflow of skilled and unskilled labor. The inflow of foreign capital decreases its rental. This, in turn, increases the wage rates of skilled and unskilled labor to restore the competitive profit conditions under the fixed commodity prices as shown in (13) and (14). If sector 2 is capital intensive, skilled wage rate increases more than the unskilled wage rate. Thus, capital inflow increases the wage inequality sector 2 is capital intensive while the inflow of skilled and unskilled labor decrease it. This implies that the policy makers in developing countries must consider this effect when they induce foreign capital as a development strategy.

4. Concluding remarks

In this paper, we have extended the Marjit-Kar model to include sectorally-mobile unskilled labor and urban unemployment, and examined the effects of labor movements on the skilled-unskilled wage inequality. The results obtained are exactly the same as that derived in Marjit and Kar (2005, Proposition 1) in that immigration of skilled or unskilled labor will decrease the wage gap if the manufacturing sector is capital intensive. The analysis shows robustness of the results by Marjit and Kar (2005) in a general setup of developing countries. This has an important policy implication for the policy makers in developing countries who suffer from chronic unemployment as well as serious wage inequalities. That is, the immigration policy suggested by Marjit and Kar (2005) can be applied to address the wage gap problem in many developing countries with unemployment. The effect of international capital movement has also been examined and compared with that of labor movement.

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