Equity Control of Multinational Firms: Effects on Income Distribution and Wage Inequality in Host Countries

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Abstract

This paper examines the effects of the equity control of multinational firms on income distribution and wage inequality in a model with skilled and unskilled labor. A large number of recipient (host) countries are developing countries characterized by scarce capital and wage inequality. The results of the study indicate that a restriction on multinational investment may raise the unskilled wage rate and lower the rental of domestic capital while it lowers the skilled wage rate if the multinational sector is strongly capital intensive. Thus, the equity control policy may improve the wage inequality. Furthermore, the increase in labor forth may decrease the wage gap if MNF sector is strongly capital intensive and/or equity control is very stringent.

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1. Introduction

Many developing countries suffer from the scarcity of capital and attempt to attract foreign capital from developed countries that show interest in the host country—more specifically, its market, resources, cheap labor, and so on. Inviting multinational firms (henceforth MNFs) is a typical approach by host countries to effectively introduce foreign capital into its economy. However, the operation of MNFs in numerous developing (host) countries may affect various aspects of the social and economic conditions in these countries. While certain developing economies have indeed benefited substantially from multinational expertise and investment, MNFs may have detrimental effects on employment, income distribution, and even national welfare in others. In this sense, foreign direct investment (FDI) through MNFs is viewed “at best, as an instrument of uncertain value in the development process and, at worst, as a contemporary form of neocolonialism” (Hill and Mendez, 1992, p.53).

This paper examines the effects of the equity control of MNFs on income distribution and wage inequality in the host countries by examining the difference between skilled and unskilled labor in the economy. Hill and Mendez (1992) discuss the effect of equity control on employment in an economy with minimum wage legislation. They assume that a minimum wage rate is fixed institutionally in both local and multinational sectors. Their analysis was followed by Beladi and Yabuuchi (2009) who reexamined the effect of equity control on employment and welfare under the dual economy setup. They argued that a large number of recipient (host) countries are developing countries with dual economies, thus implying the coexistence of two separate
economic systems that develop at different rates.\(^1\) In a series of papers, Chao and Yu examined various aspects of equity control. Chao and Yu (1996) examined the welfare effect of domestic equity controls in conjunction with export share requirements, and Chao and Yu (2000) explored the same issue in the presence of alternative types of trade restrictions and varying degrees of capital mobility. Chao and Yu (2006) examines the effect of partial privatization or foreign competition on optimum tariffs. Recently, Chao and Yu (2007) examined the effects of trade liberalization on firm ownership and the environment in a small open economy. In a related study, Beladi and Chao (2006) considered the employment and welfare effects of mixed ownership via partial privatization of state-owned enterprises in a developing economy.

However, no study examines the effects of equity control on income distribution and wage inequality in the host country. To address this research gap, this paper examines the differences between skilled and unskilled labor by specially focusing on the change in wage inequality between the two. It then investigates the implication of these differences on the changes in factor prices. The wage inequality, in addition to unemployment and welfare, is an important issue in many developing countries. Therefore, our analysis has an important policy implication for many developing countries that are aiming to introduce foreign capital in their economy by effectively restricting the amount through the equity control policy. This paper illustrates that a restriction on multinational investments may lower the inflow of foreign capital and, in turn, increases the total capital employment in the multinational sector. Furthermore, the

\(^1\) A notable example of this type of economy is China. It has a relatively developed urban sector and less-developed rural sector; moreover, it is witnessing extensive rural-urban migration in the face of urban unemployment. On the discussions of various aspects of dual economy, see, for example, Harris and Todaro (1970), Bhagwati and Srinivasan (1974), Khan (1982), Neary (1991), Beladi and Marjit (1996), Yabuuchi (1993), Gupta (1995), Basu (2000), and Marjit and Beladi (2003).
restriction on multinational investment raises the unskilled wage rate and the rental of domestic capital while it lowers the skilled wage rate if the multinational sector is strongly capital intensive. Thus, the policy may improve wage inequality. This paper will provide a theoretical background for the establishment of MNFs in developing countries. It is also shown that the increase in labor forth may decrease the wage gap if MNF sector is strongly capital intensive and/or equity control is very stringent.

The remainder of the paper is organized as follows. Section 2 presents the model of the paper and assumptions. Section 3 examines the relationship between equity control and income distribution, and the effects of equity control on wage inequality in the host country. The effects of labor growth on the wage inequality are discussed in Section 4. Section 5 presents the concluding remarks.

2. The model and assumptions

Following Hill and Mendez (1992), this paper considers a small open economy that comprises two sectors—the multinational sector, $X$, and local sector, $Y$. Sector $X$ and sector $Y$ comprise MNFs and domestic firms, respectively. The production of a local good requires unskilled labor and local capital. MNFs utilize skilled labor, unskilled labor, foreign capital, and domestic capital. Skilled labor is used only in sector $X$. It is assumed that MNFs produce a manufacturing good, while the local sector produces an agricultural good. Thus, the production functions of the manufacturing sector (i.e., MNFs), $X$, and agricultural (local) sector, $Y$, are given as follows:

$$X = F^X(L_X, K_X, H),$$

(1)
and

\[ Y = F^\gamma(L_y, K_y), \quad (2) \]

where \( K_j, L_j, \) and \( H \) represent employment of capital, unskilled labor, and skilled labor, respectively, in the \( i \)-th sector \((i = X, Y)\). The production functions are assumed to be linearly homogeneous and concave, and they satisfy the following properties:

\[
F^x_j > 0, \ F^x_{jj} < 0, \ F^x_{jk} > 0, \ F^x_{LL} F^x_{KK} - (F^x_{KL})^2 > 0 \quad (j, k = L, K, H; j \neq k), \quad (3a)
\]

and

\[
F^y_j > 0, \ F^y_{jj} < 0, \ F^y_{jk} > 0, \ F^y_{LL} F^y_{KK} - (F^y_{KL})^2 = 0, \quad (3b)
\]

where \( F^i_j \) is the marginal product of the \( j \)-th factor in sector \( i \) \((i = X \text{ and } Y)\), \( F^i_{jj} \) is the change in the marginal product of the \( j \)-th factor with respect to its own factor, and \( F^i_{jk} \) is the change in the marginal product of the \( j \)-th factor with respect to the \( k \)-th input \((j \neq k)\).

This paper focuses on the effects of the equity control of MNFs on income distribution and wage differential in the host country. It is assumed that the agricultural good \((X)\) is exported and is the numeraire, so that its price equals unity and it is the base good. The manufacturing good \((Y)\), on the other hand, is an importable good with world price \( p^* \) but whose domestic price \( p \) is increased because of an ad valorem tariff \( t \); that is, \( p = (1+t)p^* \).

The labor market equilibrium can be expressed as

\[ w = F^\gamma_L(L_y, K_y) = p F^\gamma_L(L_y, K_y, H), \quad (4) \]
and
\[ w_x = pF^*(L_x, K_x, H), \tag{5} \]

where \( w \) and \( w_x \) are the wage rates of unskilled labor and skilled labor, respectively.

Foreign capital employed in sector \( X \) is internationally mobile but intersectorally immobile, which implies that foreign capital cannot be employed in domestic sectors. The government imposes this equity restriction on sector \( X \) in order to protect domestic firms. Let us assume that MNFs are required to employ a certain percentage of domestic capital in sector \( X \). Let \( \beta \) represent the domestic capital requirement rate. Thus, the total capital employed in sector \( X \), \( K_x \), is the sum of the capital borrowed in local and world markets; that is,

\[ K_x = K^d_x + K^f_x = \beta K_x + (1-\beta)K_x, \]

where \( K^d_x = \beta K_x \) and \( K^f_x = (1-\beta)K_x \) are the domestic and foreign capital used in sector \( X \), respectively.

Foreign capital receives the fixed world rental rate, \( r^* \), while domestic capital receives the common rental rate, \( r \). Thus, the profit of sector \( X \) may be expressed as

\[
\Omega = pF^*(L_x, K_x, H) - w_x L_x - (rK^d_x + r^*K^f_x) \\
= pF^*(L_x, K_x, H) - w_x L_x - \{r\beta + r^*(1-\beta)\}K_x.
\]

It is assumed that all firms seek to maximize profits; then, it holds that
\[ \frac{\partial \Omega}{\partial K_x} = pF^*(L_x, K_x, H) - (r\beta + r^*(1 - \beta)) = 0. \]

Thus, we obtain

\[ pF^*(L_x, K_x, H) = \beta r + (1 - \beta)r^*, \quad (6) \]

where \( r^* \) is the fixed foreign rental and

\[ r = F^*(L_y, K_y). \quad (7) \]

Since both domestic and foreign capital are invested in sector \( X \), the effective capital rental rate is the weighted average of the domestic and foreign capital rental rates. Foreign capital receives the fixed world rental rate, \( r^* \), while domestic capital receives the common rental rate, \( r \). It is natural to assume that \( r \) is higher than \( r^* \) in the model employed in this paper.

The labor employment conditions in the host country are represented as

\[ L_x + L_y = L. \quad (8) \]

Finally, the employment condition of domestic capital is\(^2\)

\[ \beta K_x + K_y = K^d. \quad (9) \]

\(^2\) See Hill and Mendez (1992) for this formulation of the domestic capital market.
Thus, foreign capital may be expressed as

\[ K'_x = (1 - \beta)K_x. \] (10)

This completes the specification of the model employed in this paper. We have eight unknown variables—\( r, w, w_s, L_s, L_y, K_s, K_y \)—and \( K'_x \)—that are solved by eight equations, (4)–(10), for the given parameters \( r^*, p, K^d, L, H, \) and \( \beta \).

3. Equity control and income distribution

3-1. The change in wage rates

This section examines the effects of the changes in the domestic capital requirement rate (\( \beta \)) on the factor rewards. Differentiating (4)–(10) and arranging terms with respect to the key variables, we obtain

\[
\begin{bmatrix}
pF^{x}_{il} & 0 & pF^{x}_{hk} & 0 & -1 & 0 & 0 & dL_x & 0 & 0 \\
pF^{x}_{kl} & 0 & pF^{x}_{kk} & 0 & 0 & 0 & -\beta & dL_y & (r - r^*) & 0 \\
0 & F^{y}_{kl} & 0 & F^{y}_{kk} & 0 & 0 & 0 & 1 & dK_x & 0 \\
1 & 1 & 0 & 0 & 0 & 0 & 0 & 1 & dK_y & 0 \\
-pF^{x}_{ll} & F^{y}_{ll} & -pF^{y}_{lk} & F^{y}_{lk} & 0 & 0 & 0 & dL_r & 0 & 0 \\
0 & 0 & \beta & 1 & 0 & 0 & 0 & -K_x & 0 & dK^d \\
0 & F^{y}_{ll} & 0 & F^{y}_{lk} & 0 & -1 & 0 & 0 & 0 & 0
\end{bmatrix}
\begin{bmatrix}
dL_x \\
dL_y \\
dK_x \\
dK_y \\
dL_r \\
dL \\
dr
\end{bmatrix} = \begin{bmatrix}
0 \\
0 \\
0 \\
0 \\
d\beta + dL \\
0 \\
0
\end{bmatrix}.
\] (11)

By solving (11) for \( w \), with respect to \( \beta \), we have
\[
dw_s / d \beta = [(r - r^*) \{ (pF^x_{HL}pF^x_{LK} - pF^x_{HK}pF^x_{LL}) - F^y_{LL}pF^y_{HK} \} \\
\quad - K_x F^y_{KK} (k_x - \beta k_x) (pF^x_{HL}pF^x_{KK} - pF^x_{HK}pF^x_{LK})] / \Delta,
\]

(12)

where \( \Delta \) is the value of the determinant of the coefficient matrix of the equation system; that is,

\[
\Delta = -[\Pi + F^y_{KK} \{ \beta^2 pF^x_{LL} + 2\beta k_x pF^x_{LK} + (k_x)^2 pF^x_{KK} \}] < 0,
\]

(13)

where \( \Pi = F^x_{LL} F^x_{KK} - F^x_{LK} F^x_{KL} \). It can be seen that \( \Delta < 0 \) since \( \Pi > 0 \) and the quadratic form in the curly brackets in (14) is negative definite because of the property of the production function.

In addition, from (11), we obtain

\[
dw / d \beta = F^y_{LK} \{ \tilde{r} pF^x_{LL} \{ \beta (r - r^*) / \tilde{r} - \tilde{z}^x_{KK} \} + pF^y_{LK} \{ (r - r^*) k_y - k_x \tilde{z}^x_{KL} \} \} / \Delta,
\]

(14)

where \( k_x = K_x / L_x \), \( k_y = K_y / L_y \), \( \tilde{z}^x_{KK} = - (K_x / \tilde{r}) pF^x_{KK} \) and \( \tilde{z}^x_{KL} = - (L_y / \tilde{r}) pF^x_{KL} \). Thus, we have the following proposition.

**Proposition 1.** An increase in the domestic capital requirement rate lowers the skilled wage rate \( (w_s) \) if \( \beta k_x > k_y \), and it raises the unskilled wage rate \( (w) \) if \( \tilde{z}^x_{KK} < (r - r^*) / \tilde{r} \) and \( \tilde{z}^x_{KL} > (r - r^*) k_y / k_x \).
In order to interpret the results, let us examine the effects of the change in the domestic capital requirement rate on resource allocation. From (11), we obtain

\[ \frac{dK_s}{d\beta} = -\{(r - r^*)(F_{yy}^x + pF_{yy}^x) + K_s(F_{kk}^x pF_{kk}^x - \beta F_{kk}^y pF_{kk}^y)\} / \Delta. \]  

(15)

Note that

\[ (F_{kk}^x pF_{kk}^x - \beta F_{kk}^y pF_{kk}^y) = F_{kk}^y \{(\beta k_x - k_y) pF_{kk}^x + pF_{kk}^y h_x\}. \]  

(16)

where \( h_x = H_s / K_s \). Thus, it can be seen that \( dK_s / d\beta < 0 \) if \( \beta k_x > k_y \).

Thus, the increase in the domestic capital requirement rate increases the effective rental and decreases the employment of foreign and domestic capital if sector \( X \) is strongly capital intensive in the sense that \( \beta k_x > k_y \). The domestic capital released from sector \( X \) will be absorbed in sector \( Y \), thus contracting sector \( X \) and expanding sector \( Y \). Accordingly, labor also will be reallocated from sector \( X \) to sector \( Y \). Thus, because the capital and labor are withdrawn from sector \( X \), the skilled wage rate decreases owing to the decrease in the value marginal product of skilled labor. On the other hand, more labor will be required in sector \( Y \) than that released from sector \( X \) because the former is more labor intensive than the latter. Furthermore, if the value marginal product of capital is inelastic to capital and elastic to labor employed in sector \( X \) (i.e., \( \xi_{kk}^< < (r - r^*) / \tilde{r} \) and \( \xi_{kk}^> > (r - r^*)k_y / k_x \)), then large amount of capital is reallocated from sector \( X \) to sector \( Y \). Thus, this increases the value marginal product of labor in sector \( Y \) and tends to increase the unskilled wage rate.
The following proposition can be made on the basis of the result on the changes in the skilled and unskilled wage rates.

**Proposition 2.** An increase in the domestic capital requirement rate improves the skilled-unskilled wage inequality if \( \beta k_x > k_y \), \( \xi_{KK}^x < (r - r^*) / \bar{r} \) and \( \xi_{KL}^x > (r - r^*) k_y / k_x \).

This implies that the equity control policy has a positive effect on wage inequality. This paper shows that equity control decreases wage inequality if sector \( X \) is strongly capital intensive relative to sector \( Y \), and the value marginal product of capital is inelastic to capital and elastic to labor employed in sector \( X \) (i.e., \( \xi_{KK}^x < (r - r^*) / \bar{r} \) and \( \xi_{KL}^x > (r - r^*) k_y / k_x \)).

**3-2. The change in the rental of domestic capital**

Now, let us examine the change in the rental rate of domestic capital. From (11), we obtain

\[
\frac{dr}{dF} = F_{KL}^x dL_y + F_{KK}^x dK_y = -(F_{LL}^y dL_y + F_{LK}^y dK_y) / k_y = -dw y / k_y . \tag{17}
\]

Thus, from (14) and (17), the following proposition can be easily deduced.
Proposition 3. An increase in the domestic capital requirement rate decreases the rental of domestic capital if \( \xi_{KK}^{x} < (r - r^{*}) / \tilde{r} \) and \( \xi_{KL}^{x} > (r - r^{*})k_{y} / k_{x} \).

From (11), it can be seen that

\[
\frac{dK_{y}}{d\beta} = \{ F_{LL}^{y} \tilde{r} \{ (r - r^{*}) / \tilde{r} - \xi_{KK}^{x} \} \\
+ \beta \{ (r - r^{*}) pF_{LL}^{x} - K_{y} F_{KL}^{y} pF_{LK}^{x} \} / \Delta \}. \tag{18}
\]

Thus, domestic capital employment in sector \( Y \) as a result of the increase in the domestic capital requirement rate increases under the assumption that \( \xi_{KK}^{x} < (r - r^{*}) / \tilde{r} \). This, in turn, decreases the domestic rental along the value marginal product of capital in sector \( Y \), while the increase in the employment of unskilled labor increases the rental since \( F_{LK}^{y} > 0 \). Proposition 3 shows that the former effect is dominant and the policy eventually decreases the domestic rental under the assumption.

On the other hand, from (11), we have

\[
\frac{d\Pi}{d\beta} = \{ K_{x} F_{KK}^{y} \tilde{\Pi} - (r - r^{*}) (F_{KK}^{y} pF_{LK}^{x} - \beta F_{KK}^{y} pF_{LL}^{x}) \} / \Delta . \tag{19}
\]

Thus, it can be seen alternatively that the rental will decrease if skilled labor is independent of labor and capital in the production of sector \( X \). Then, \( F_{LL}^{y} = F_{KK}^{y} \approx 0 \), which implies that \( \tilde{\Pi} = (F_{LL}^{x} F_{KK}^{y} - F_{KL}^{x} F_{LK}^{y}) \approx 0 \). Conversely, it will increase if the difference between the domestic and foreign rentals is sufficiently small. In any case, our
result shows that the equity control policy allocates domestic capital from the multinational sector to the domestic sector, and it may have a detrimental effect on the domestic rental.

4. Immigration and wage inequality

In this section, let us examine the effects of the increase in unskilled labor due to immigration or population growth on the factor rewards and the wage inequality in the presence of equity control. It is commonly observed that there is an extensive inflow of foreign workers to newly industrialized countries from neighboring developing countries.

It can be seen from (11) that

\[
dw_x / dL = -F_{LL}^x (\beta k_x - k_y) (p F_{Lx}^x (k_x p F_{Hx}^x + p F_{Hh}^x) \\
+ h x p F_{Hx}^x p F_{Hk}^x) / k_x k_y \Delta
\]

and

\[
dw / dL = -F_{LL}^x \Pi / \Delta.
\]

Thus, the results are summarized in the following proposition.

Proposition 4. The increase in unskilled labor decreases (increases) the skilled wage rate if and only if \( \beta k_x > (>) k_y \), while it decreases the unskilled wage rate.

Proposition 4 shows that the increase in unskilled labor decreases the unskilled wage rate unconditionally. However, the effect on the skilled wage rate depends on the factor
intensity. If sector $X$ is strongly capital intensive in the sense that $\beta k_x > k_y$, the increase in unskilled labor expands the labor-intensive sector $Y$ and contracts the capital-intensive sector $X$. Thus, both domestic capital and unskilled labor are reallocated from sector $X$ to sector $Y$. This movement of the factors decreases the value marginal product of skilled labor and reduces the skilled wage rate. On the other hand, if $(k_x >)k_\gamma > \beta k_x$, domestic capital and unskilled labor move the other way, and the skilled wage rate increases. In this case, sector $Y$ is capital intensive in terms of the domestic capital intensity, while the sector is labor intensive in terms of total (foreign and domestic) capital intensity. This causes the reverse movement of the factors, and increases the value marginal product of skilled labor. This eventually raises the skilled wage rate.

Now let us examine the effect on the wage inequality. From (20) and (21), we obtain

$$
(dw_y / dL - dw / dL) = -F_{kL}^x \{ \beta k_x - (1 + h_y)k_y \} \\
\{ pF_{kL}^x (k_x pF_{hL}^x + pF_{hL}^x) + h_y pF_{hL}^x pF_{hL}^x \} / k_y k_x \Delta.
$$

Thus, we have the following proposition.

**Proposition 5.** The increase in unskilled labor decreases (increases) the wage inequality if and only if $\beta k_x > (<) (1 + h_y)k_y$.

The increase in unskilled labor decreases the unskilled wage rate. Therefore, the effect on the wage inequality depends totally on the change in the skilled wage rate. If $\beta k_x < k_y$,
the skilled wage rate increases, and then the wage inequality must expand. However, if \( \beta k_x > k_y \), labor growth decreases the skilled wage rate, and then there is a possibility that the wage inequality improves. Our result shows that the wage inequality decreases if and only if \( \beta k_x > (1 + h_x)k_y \). The condition will be met if sector \( X \) is strongly capital intensive and/or equity control is very stringent. In this case, large amount of capital and unskilled labor are withdrawn from sector \( X \). This has strong pressure to push down the skilled wage rate, thus possibly resulting in the decrease in the wage inequality.

Finally, let us make a brief remark on the effect of capital accumulation on the wage inequality. It can be seen from (11) that capital inflow has exactly the opposite effect than the effects of the increase in unskilled labor. The increase in the domestic capital increases (decreases) the skilled wage rate if and only if \( \beta k_x > ( )k_y \), while it increases the unskilled wage rate. Furthermore, it can be shown that capital accumulation decreases (increases) the wage inequality if and only if \( \beta k_x > (1)(1 + h_x)k_y \). This implies that the policy makers must consider the difference of the effects between labor growth and capital accumulation on the wage inequality when they induce foreign labor or accumulate capital as a development strategy.

5. Concluding remarks

This paper examined the effects of the equity control of MNFs on income distribution and wage inequality in developing (host) countries. The main finding is that restrictions on multinational investment may lower skilled wage rate and increase unskilled wage rate. Therefore, this restrictive policy may decrease the wage gap and improve wage inequality. The equity control policy was originally formulated to protect
domestic capital from FDI by MNFs. However, as far as the effect on income distribution is concerned, the increase in the domestic capital requirement rate may decrease the rental of domestic capital. Furthermore, the increase in labor forth may decrease the wage gap if MNF sector is strongly capital intensive and/or equity control is very stringent.

The increase in the domestic capital requirement rate decreases the inflow of foreign capital as well as the employment of domestic capital in the MNF sector if the MNF sector is strongly capital intensive. The domestic capital is reallocated from the MNF sector to another sector. However, the latter sector is more labor intensive than the MNF sector, thus possibly resulting in an increase in the unskilled wage rate and a decrease in the rental of domestic capital. This suggests that the equity control policy may have some other purpose, for example, to prevent the monopoly of foreign MNFs and to limit their market power in the host countries, along with introducing new and superior technologies into the country.
References


