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Foreign Enclaves, Informal Sector and Urban Unemployment in Efficiency-Wage Model

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We consider a small open Harris-Todaro (1970) economy with a rural foreign enclave and urban informal sector. We introduce consumption-efficiency relation to explain the simultaneous existence of informal sector and urban unemployment. Different types of immobility and mobility of capital are assumed in different sections of this paper. We also analyse the effects of expansion of foreign enclave on urban unemployment, on the degree of urbanisation and on domestic factor income.

Keywords: foreign enclave, informal sector, urban unemployment, efficiency-wage
JEL Classification Numbers: C6, H2

1. Introduction

Many developing countries need to find ways to raise national income and lower unemployment simultaneously under disadvantaged conditions. Attracting foreign companies to foreign enclaves are surely one of major options for policymakers. Hence, the issue on foreign enclave is highly important. The recent literature on foreign enclave has enlightened the expansion of foreign enclave and its effects on unemployment and national income. The issue on foreign enclave includes the works of Young (1987), Young and Miyagiwa (1987), Miyagiwa (1986), Datta Chaudhuri and Adhikari (1993), Gupta (1994a, 1994b). All the models are basically Harris-Todaro (1970) type, complementing a foreign enclave and in all the models foreign enclave uses sector-specific capital.

In the Young-Miyagiwa (1987) model, foreign enclave is located in the rural sector and capital is purely non-shiftable among all the sectors. They have shown that the expansion of foreign enclave through the reduction in tariff on intermediate inputs lowers unemployment.

Datta Chaudhuri and Adhikari (1993) have considered capital mobility between the rural sector and the urban sector and have introduced supply function of foreign capital in the Young-Miyagiwa (1987) model. They have shown that tariff reduction

on intermediate input raises unemployment. In Gupta (1994), we find DFZ in the urban area and domestic capital is shiftable between the rural sector and the urban non-DFZ. He has shown that the reduction in import duty on intermediate goods, used in the foreign sector, raises unemployment, but we get opposite result if tariff on final goods is reduced.

In this paper, we consider a small open Harris-Todaro economy with rural foreign enclave and urban informal sector. None of the existing models on foreign enclaves considers the co-existence of these two sectors. However, in reality, we find the informal sector plays important role in the absorption of the labour force. In Africa, 60% of total urban employment is found in the informal sector. The figures reaches 57% in Bolivia and Madagaskar, 56% in Tanzania, 53% in Colombia, 48% in Thiland and 46% in Venezuela. In Uganda, we find 90% of the total non-farm private sector workers are engaged in the informal sector (see Haan 2002). According to the OECD the Mexican informal units provide 44% of urban employment (see Franco 1999). In the European Union, 20 million workers are employed in informal sector. Thus, the inclusion of the informal sector in the analysis of economic development is highly justified for the developing countries.

It is almost known that labour standards signal job quality. Compliance with labour standard ensures job in high productivity formal sector, whereas low-productivity informal sector employs workers having no compliance with labour standard[1)]. The, formal-informal distinction with respect to Government regulation has been observed in the works of Sylvain Dessy and Stephane Pallage (2003), Yoshiaki Azuma and Herschel Grossman (2002), Tito Borci and Pictro Gariboldi (2002), Pinelopi Goldberg and Nina Pavenik (2003) and James Rauch (1991). Goldberg and Pavenik (2003) offer an efficiency wage model of the informal sector. In their model, regulation protecting formal sector workers ensures they can not be monitored and they receive above-market wages inorder to discourage shirking.

It is universally accepted that employers can raise workers' productivity by paying higher wages and this is justified for the low wage sector having no labour standard. Thus, the efficiency-wage relation is applicable to the urban informal sector[2)]. The idea of the efficiency-wage theory first developed by Leibenstein (1957) and then Stiglitz (1976), Bliss and Stern (1978), Akerlof and Yellen (1986) and Weiss (1990). The basic idea of the efficiency-wage theory is that a worker's efficiency is positively related to the wage rate he receives. This is generally valid in the case of low income workers who consume the whole wage income and suffer from malnutrition. The employers use this wage as an instrument of profit maximisation and the optimum wage appears to be unique and independent of other economic variables. Urban unemployment may be explained by the efficiency-wage relation

[1)] It is assumed that the rural sector is more productive than the urban informal sector and this is reflected in the capital intensity assumption of the two sectors.

[2)] It is assumed that the rural sector is more capitalised which ensures higher efficiency for the workers.

in the urban informal sector[3].

Our model differs from the existing mdels on the foreign enclave in the sense that: 1. we include urban informal sector in this model; 2. we introduce efficiency wage relation in the urban informal sector and explain urban unemployment interms of such relation; 3. we consider both shiftable and non-shiftable capital; 4. we assume foreign enclave expands through fiscal concession (i.e. output subsidies), not through the reduction in tariff[4] and we examine the impact of expansion of the foreign enclaves, thru the fiscal concessions, on urban unemployment and domestic factor income.

The model is described in Section 2. In this section we assume the non-shiftability of domestic capital among the rural sector, urban formal sector and urban informal sector. The basic model is extended, by introducing different types of capital mobility among the three domestic capital using sectors, in Sections: 3, 4, 5, 6. Conclusions are made in Section 7.

2. The Model

2.1. Assumptions

We consider a small open Harris-Todaro (1970) economy complementing the rural foreign enclave and the urban informal sector. Here, the foreign enclave is located in the rural areas[5]. The urban formal sector, rural sector and the foreign enclave produce internationally traded goods and the prices of these goods are exogenously given[6]. The urban informal sector produces non-traded goods whose price is determined within the domestic economy.

The production functions of all the sectors exhibit CRS and have positive and diminishing marginal productivity to each input. Each sector uses only two inputs-labor and capital. Capital is measured in physical unit, while labor is measured in efficiency unit[7].

Workers' efficiency is positively related to the wage rate they receive. Such efficiency wage relation is more pronounced when the wage rate is low. It is assumed that the worker's efficiency is equal to one after a certain level of wage W^* and is less than one below that specified level of wage. The wage rates in the urban formal sector, rural sector and the foreign enclave are higher than this specified level of wage, while the wage rate in the urban informal sector is assumed to be less than

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[3] Fields (1989) explains urban unemployment in a framework where people remain unemployed for full time searching for urban formal sector jobs. Gupta (1993) explains this in terms of market clearing for the rural sector's product whose price is fixed.

[4] The existing models on foreign enclave assume the expansion of foreign enclave through the reduction in tariff either on imported inputs or on the final imported gods.

[5] Both Y-M (1987) an Tamal Datta Chaudhuri (1989) consider rural Foreign enclave, whereas Gupta (1994)
considers urban Foreign enclave.

[6] This is due to the assumption of small country.

[7] The efficiency-wage theory implies that physical unit of labour differs from efficiency unit of labour.

this level. Thus, for the UFS, RS and the foreign enclave, labor expressed in labor time is identical to that expressed in efficiency unit. However, for the UIS efficiency units of labor differ from the labor time units of labor.

All the markets are assumed to be perfectly competitive. The assumptions of CRS production functions and profit maximizing behaviour of the firm imply the equality between price and unit cost in each sector and the minimisation of cost of one efficiency unit of labor.

Workers migrate from the rural sector to the urban region. Some of them are absorbed either in the UFS or in the UIS and a portion of them remains unemployed in the urban sector. The migration mechanism is of Harris-Todaro (1970) type.

Urban formal wage rate is institutionally fixed and is higher than the wage rates in all other sectors. The rural wage rate and the wage rate in the foreign enclave are equal since the workers are perfectly mobile between the rural sector and the foreign enclave.

We assume that the foreign enclave uses sector specific foreign capital and its supply is assumed to be exogenously given[8]. It is also assumed that the entire foreign capital income is fully repatriated[9]. Domestic capital is also assumed to be non-shiftable. Thus, we have different rate of returns on capital in different sectors. The endowment of labor and domestic capital are also exogenously given.

It is assumed that the urban formal sector is more capital intensive than the rural sector which is more capital intensive than the urban informal sector.

2.2. Notations

$j = u, i, r, F.$

u = Urban formal sector.

i = Urban informal sector.

r = Rural sector.

F = Foreign enclave.

X_j = Level of output in the j th sector.

L_j = Level of employment in the j th sector.

k_j = Capital intensity of the j th sector.

W_j = wage rate in the j th sector for $j = i, r, F$.

W_u^* = Fixed wage rate in the u sector.

h = Worker's efficiency.

R_j = Rental rate on capital in the j th sector.

V_i = Cost of one efficiency unit of labor in the urban informal sector.

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[8] Datta Chaudhuri and Adhikari (1989) have introduced the supply function of foreign capital.

[9] If entire foreign capital income is repatriated, domestic factor income does not include the rental income on foreign capital.

L = Labor endowment of the entire economy.
K_j = Stock of capital in the j th sector.
P_j = Producer's effective price of the j th good.
f_j = Intensive production function of the j th good.
C_j = Unit cost of production of the j th good.
U = Level of urban unemployment.
Y = Domestic factor income of the economy.
μ = Degree of urbanisation.[10)]

2.3. The Equations

The intensive production functions of the four sectors are given by:

$$X_u = L_u f_u(k_u); \tag{1}$$
$$X_i = L_i f_i(k_i, h); \tag{2}$$
$$X_r = L_r f_r(k_r); \tag{3}$$
$$X_F = L_F f_F(k_F); \tag{4}$$

The efficiency-wage relation in the informal sector is given by:

$$h = h(W_i); \tag{5}$$

Following restrictions are imposed on this efficiency function:

i) $h'(W_i) > 0$ for $W_i < W^*$; ii) $h(W_i) = 1$ for $W_i \geq W^*$;

ii) and iii) $h''(W_i) \geq 0$ for $W_i \leq W^{**} < W^*$.

The cost of one efficiency unit of labor in the urban informal sector is:

$$V_i = (W_i / h(W_i)); \tag{6}$$

The minimisation of efficiency unit cost of labor implies:

$$(h'(W_i)(W_i/h(W_i)) = 1. \tag{7}$$

The long run equilibrium of a competitive firm implies that price is equal to the unit cost in each sector. Hence, we have the following equations:

$$P_u = C_u(W_u^*, R_u); \tag{8}$$
$$P_i = C_i(V_i, R_i); \tag{9}$$
$$P_r = C_r(W_r, R_r); \text{ and} \tag{10}$$
$$P_F = C_F(W_r, R_F) \tag{11}$$

[10)] Here, it is measured as the ratio of urban labour to the total labour of the entire economy.

The optimum capital – labor ratios are given by:

$$k_u = k_u(W_u^*/R_u); \tag{12}$$
$$k_i = k_i(V_i/R_i); \tag{13}$$
$$k_r = k_r(W_r/R_r); \tag{14}$$
$$k_F = k_F(W_r/R_F). \tag{15}$$

$$W_r = (L_u/(L - L_r - L_F))W_u^* + (L_i/(L - L_r - L_F))W_i \tag{16}$$

is the Harris-Todaro (1970) migration equilibrium condition.

Full utilisation of capital and labor implies the following equations:

$$k_u L_u = K_u; \tag{17}$$
$$k_i L_i = K_i; \tag{18}$$
$$k_r L_r = K_r; \tag{19}$$
$$k_F L_F = K_F; \text{ and} \tag{20}$$
$$\sum_j^{u,i,r,F} L_j + U = L. \tag{21}$$

The domestic factor income is given by:

$$Y = W_u^* L_u + W_i L_i + W_r L_r + W_r L_F + \sum R_j K_j. \tag{22}$$

Using Equations ((16)), (21) and (22) we get,

$$Y = W_r L + \sum R_j K_j. \tag{22a}$$

The demand for the goods produced in the UIS is given by[11]:

$$D_i = D_i(P_i),\ D_i' < 0.$$

Thus, the market equilibrium for the UIS's product is given by:

$$X_i = D_i(P_i). \tag{23}$$

This completes the equational structure of the model.

2.4. Working of the Model

The working of the model is described as follows:

Equation (7) yields the equilibrium value of W_i. Then, we get the value of V_i from Equation (6) and of h from Equation (5). Given, P_u and W_u^*, we get R_u

[11] Here, income effect is assumed away.

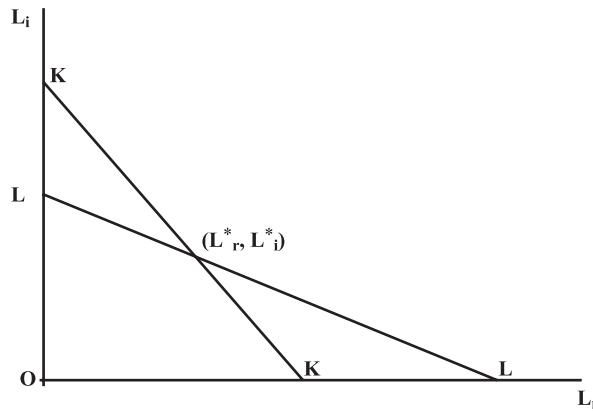

Figure 1

from Equation (8). From Equation (9) we get P_i as a function of R_i, given V_i; i.e. $P_i = g(R_i),\ g' > 0$. From Equations (2), (13) and (23) we get L_i as a function of R_i; i.e., $L_i = m(R_i)$. Substituting this and Equation (13) into Equation (18) we get R_i. Now, we can determine P_i, k_i, L_i.

Now, k_u is obtained from Equations (12). So, we get L_u from Equation (17), given K_u, and k_u.

From Equation (10) we find that R_r is a function of W_r, given P_r. Equation (11) shows W_r as function of R_F. Thus, Equations (14) and (15) show that both k_r and k_F are also functions of R_F. This implies that L_r and L_F are also functions of R_F (see Equations (19) and (20)). Thus, we can determine the equilibrium value of R_F from Equation (16), given L_u, L_i, W_u^*, W_i. Hence, we get the equilibrium values of $W_r, R_r, k_r, k_F, L_r L_F$.

Equilibrium value of unemployment is obtained from Equation (21), given L_j $(j = u, i, r, F)$.

X_j s are obtained from Equations (1) to (4). Finally, equation (22a) yields Equilibrium value of Y.

2.5. Comparative Static Effects

2.5.1. Change in P_F

If foreign enclave is expanded through the subsidization to this sector, P_F will rise. Appendix (A.1) shows that when P_F is raised, both W_r and R_F rise. Now, Equation (10) implies that R_r falls, given P_r. So, k_r rises and L_r falls, given K_r. From Equations (16) and (21) we get,

$$(W_u^* - W_r)L_u - (W_r - W_i)L_i = W_r U. \tag{16a}$$

This shows that U falls if P_F rises, given W_u^*, L_u, W_i and L_i.[12] Thus, given W_u^*, L_u, W_i and L_i

A rise in W_r implies U must fall to satisfy migration equilibrium. As both U and L_r fall, L_F rise more and this is due to the output subsidies given to the foreign enclave. Thus, we find that L_u, L_i *remain* fixed and U, L_r fall and L_F rises. Thus, $\mu = (1/L)(L_u + L_i + U)$ falls.

Now, we examine the effect of a rise in P_F on Y. As P_F is raised, W_r rises, R_r and R_F fall[13]. So we can write,

$$\begin{aligned} dY &= LdW_r + K_r dR_r; \\ or, dY &= dR_r((LdW_r/dR_r) + K_r) = dR_r(k_r L_r - Lk_r) \\ &= k_r dR_r(L_r - L) > 0, \text{ since (since } dR_r < 0). \end{aligned}$$

So Ywill rise.

The above results lead to the following proposition:

Proposition 2. If capital is purely non-shiftable, expansion of rural foreign enclave through subsidization to this sector lowers urban unemployment, raises domestic factor income and also lowers degree of urbanisation.

In the Young-Miyagiwa model, expansion of foreign enclave lowers Unemployment and in Datta Chaudhuri, it raises unemployment. However, in these two models foreign enclave expands through the reduction in import duty on intermediate input used in this sector.

3. Capital Mobility between the Urban Informal Sector and the Rural Sector

3.1.

In this Section the basic model is extended by introducing capital mobility between the rural sector and the urban informal sector. The other two sectors use sector-specific capital.

3.2. Equations

Since the capital is mobile between the rural sector and the urban informal sector, we have a common rate of return on capital in these two sectors. Thus, the price equations for the rural sector become:

$$P_r = C_r(W_r, R_i). \tag{10a}$$

The two capital endowment equations will merge into one equation:

$$k_i L_i + k_r L_r = K. \tag{19a}$$

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[12] If W_r changes large so that $W_r > W_u^*$ Equation (16) holds if $W_i > W_r > W_u^*$. This implies, U must fall when W_r rises.

[13] It is assumed that the foreign capital income is fully repatriated.

The optimum capital intensity for the rural sector becomes:

$$k_r = k_r(W_r/R_i). \tag{14a}$$

The domestic factor income is now given by:

$$Y = W_r L + R_u K_u + R_i K. \tag{22a′}$$

All other equations of the previous model still hold in this extended model also.

3.3. Working of the Model

Like the model of Section 2 the optimum values of $W_i, h, V_i, R_u, k_u, L_u, X_u$ are obtained from Equations (1), (5) to (7), (8), (12), (17).

From Equation (9) we get P_i as a function of R_i, given V_i; i.e. $P_i = g(P_i)$, $g' > 0$. From Equations (2), (13) and (23) we get L_i as a function of R_i; i.e., $L_i = m(R_i)$.

Now, Equation (10a) gives W_r as a function of R_i given P_r .

Then, from Equation (11), we get R_F as a function of W_r, which in turn depends on R_i. Now, from Equations (15) and (20) we get L_F as function of R_i. Using (13), (14a), (19a) and the L_i function we find L_r also depends on R_i. Then, Equation (16) yields equilibrium R_i. Now, we get all the variables dependent on R_i.

Now, equilibrium level of unemployment is obtained from Equation (21). The level of output of the rural sector and the urban informal sector are obtained from Equations (2) and (3). Finally, Equation (22a′) yields the domestic factor income.

3.4. Comparative Static Effects

3.4.1. Change in P_F

Subsidization to output in the foreign enclave raises P_F. Then, R_F rises and W_r falls. Thus, (W_r/R_F) falls and so as k_F. Hence, L_F rises, given K_F (see Equation (20)).

Now, the higher R_i implies higher P_i (see Equation (9)). So, L_i falls to restore equilibrium for the informal commodity. k_i and k_r fall if R_i rises. So, L_r must rise (see Equation (19a)).

Equation (16a) shows that U rises if W_r and L_i fall, given W_u^*, L_u, W_i.

The degree of urbanisation is $\mu = 1-(L_F + L_r)/L$. As both L_F and L_r rise μ falls.

It is assumed that the income from foreign capital is totally repatriated. As we find that the rise in P_F lowers W_r and raises R_i. So, we can write,

$$\begin{aligned} dY &= L dW_r + K_i dR_i; \\ or, dY &= dR_i((L dW_r/dR_i) + K_i) \\ &= dR_i(k_i L_i - L k_r) < 0, \text{since, } k_i < k_r \text{ and } L_i < L. \end{aligned}$$

So, Y falls.

Thus, we can get the following proposition:

Proposition 3. Expansion of the foreign enclave through the output subsidy to that sector raises urban unemployment, lowers domestic factor income and also leads to lower degree of urbanisation if foreign enclave and urban formal sector use sector-specific capital and other capital is mobile between the urban informal sector and the rural sector.

3.4.2. Change in K_F

An increase in the stock of foreign capital raises K_F. As factor prices W_r and R_F do not depend upon K_F, the rise in K_F raises L_F. This rise in L_F produces the results similar to those obtained in the previous case. Thus, even if the foreign enclave is expanded through the increase in the stock of foreign capital, urban unemployment rises and domestic factor income and the degree of urbanisation fall.

4. Capital Mobility between the UFS and the RS

4.1. Assumptions

In this Section we extend the model of Section 2. by introducing capital mobility between the UFS and the RS. The other two sectors are assumed to use the sector-specific capital.

4.2. Equations

Since the UFS and the RS use the same type of capital and there is no distortion in this capital market, we get uniform rate of return on capital in these two sectors, R_u.

Thus, the price equation for the rural sector (Equation (10)) becomes

$$P_r = C_r(W_r, R_u). \tag{10b}$$

The optimum rural capital intensity is given by

$$k_r = k_r(W_r/R_u). \tag{14a}$$

The capital endowment Equations (17) and (18) become

$$k_u L_u + k_r L_r = K_u. \tag{17a}$$

The domestic factor income is given by

$$Y = W_r L + R_u K_u + R_i K \tag{22a'}$$

4.3. Working of the Model

The equilibrium value of W_i, V_i and h are obtained from Equations (5) to (7). Equation (8) gives R_u. Equilibrium W_r is obtained from Equation (10b), given $P_r \& R_u$. Then, we get R_F from Equation (11), given P_F. Thus, weget, k_u, k_r, k_F. So, we obtain L_F, given K_F.

Now, Equation (9) gives P_i as a function of R_i, given V_i and substituting this into the Equation (23) we find L_i as a function of R_i. Then, R_i can be obtained from Equation (18), given K_i. When R_i is obtained, P_i, k_i, L_i are also obtained.

Now, from Equations (16) and (17a) we get the equilibrium values of L_u and L_r. This may be shown graphically (see Fig. 2). The $L'L'$ curve is obtained from Equation (16) and the $K'K'$ curve is obtained from Equation (17a) Both the curves are negatively sloped. The $K'K'$ steeper than the $L'L'$ curve, since we assume that the urban sector is more capital intensive than the rural sector in value terms. The intersection of the two curves determines (L_u^*, L_r^*) .

Now, we can determine the equilibrium U from Equation (21). Thus, the equilibrium levels of output can be obtained from Equations (1) to (4).

Finally, Equation (22a′) yields the equilibrium value of Y.

4.4. Comparative Static Effects

4.4.1. Change in P_F

Output subsidy given to the foreign enclave raises P_F. This also raise R_F; given W_r. So, (W_r/R_F) falls and so also k_F. This implies that L_F will rise, given K_F. This will shift the $L'L'$ curve to the left. As a result, L_u rises and L_r falls. (See the Appendix A.3). From Equations (16a) we find if L_u rises, U also rises, given W_u^*, W_i, W_r, L_i.

So far as Y is concerned, we find the rise in P_F has no effect on Y since W_t, R_u, R_i remain frozen in this case.

Now, μ rises, since L_u rises, U rises and L_i, L remain fixed.

Thus, we can make the following proposition:

Proposition 4. If foreign enclave is expanded through the output subsidy given to this sector, urban unemployment and the degree of urbanisation rise, but domestic factor income does not change at all.

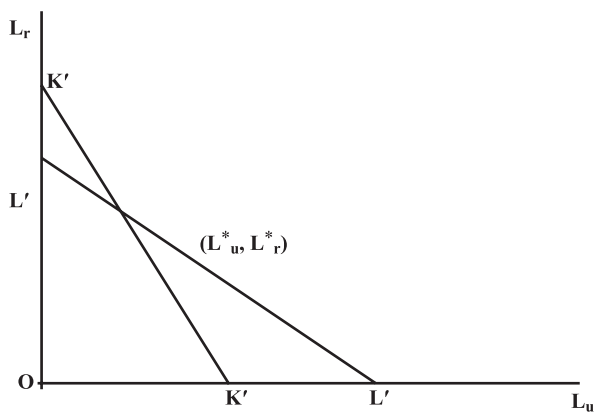

Figure 2

4.4.2. Change in K_F

If foreign capital is enlarged, L_F rises, given k_F. In this case, we get the similar results as obtained when P_F is raised. Thus, even if the foreign enclave is expanded through the increase in the stock of foreign capital, urban unemployment rises, degree of urbanisation rises but domestic factor income remains unchanged.

5. Capital Mobility between Urban Formal Sector and Urban Informal Sector

5.1. Assumptions

Here, we assume that capital is mobile between urban formal sector and urban informal sector, while the rural sector and the foreign enclave use sector-specific capital. Thus, we a common rate of return on capital in the urban sectors.

5.2. Equations

Since, capital is mobile within the urban sector we have the same rate of return in the two urban sectors. Thus, Equation (9) becomes:

$$P_i = C_i(V_i, R_u). \tag{9b}$$

The optimum capital intensity for the urban informal sector becomes:

$$k_i = k_i(V_i/R_u); \tag{13b}$$

The two capital endowment equations (17) and (18) become:

$$k_u L_u + k_i L_i = K_u. \tag{18b}$$

All other equations of the Section 2 remain the same.

5.3. Working of the Model

We can get W_i, h, V from Equations (5), (6), (7). Then, R_u is obtained from Equation (8). Equation (9b) yields P_i, given V_i and R_u. Ki is obtained from Equation (13b). We get L_i from Equation (16). Equation (13) gives L_u, given k_u, k_i, L_i and K_u. From Equations (10) and (11) we get both R_r and R_F as functions of W_r. So, k_r and k_F are also functions of W_r. Now, Equations (14) and (15) show that both L_r and L_F are also functions of W_r. Then, from Equation (12) we get, W_r. Now, we get all variables dependent on W_r : $R_r, R_F, k_r, k_F, L_r, L_F$. U is determined from Equation (17). Finally, Y is obtained from Equation (22a′). All the products are obtained from Equations (1) to (4).

5.4. Comparative Static Effects

5.4.1. Change in P_F

Subsidisation to the foreign enclave raises P_F. This would raise R_F and lower W_r. The lower W_r raises R_r. Both k_r, k_F fall and L_r, L_F rise. There is no change in R_u, P_i, L_i, L_u. Thus, U falls.

Now, μ falls as U falls and L_u, L_i and L remain fixed.
The effect on Y can be obtained from Equation (22a′). Change in Y is:

$$\begin{aligned} dY &= LdW_r + K_r dR_r \\ &= LdR_r(K_r/(L - L_r)) < 0, \text{ since } dR_r > 0 \text{ and } k_r > K_r/L. \end{aligned}$$

Thus, we have the following proposition:

Proposition 5. The expansion of foreign enclave through the ourput subsidies given to this sector lowers all: unemployment, degree of urbanisation and domestic factor income if capital is mobile within the urban sector and the rural sector and foreign enclave use sector-specific capital.

5.4.2. Change in K_F

If K_F is enlarged, L_F will rise. Like the Section 5.4.1., this will produce the similar effects on U, μ, Y.

6. Capital Mobility among the UFS, UIS, and the RS

6.1. Asumptions

In this section, we assume perfect capital mobility among the UFS, UIS and RS, while foreign enclave uses sector-specific foreign capital. Thus, we have a common rate of return on domestic capital.

We assume that UFS is more capital intensive than the RS which is more capital intensive than the UIS in value terms.

6.2. Equations

Since the domestic capital is mobile among the UFS, UIS and RS the three price equations become:

$$P_u = C_u(W_u^*, R); \tag{8c}$$
$$P_i = C_i(V_i, R); \text{ and} \tag{9c}$$
$$P_r = C_r(W_r, R). \tag{10c}$$

The optimum capital intensities for the three domestic capital using sectors become:

$$k_u = k_u(W_u^*/R); \tag{12′}$$
$$k_i = k_i(W_i/R); \text{ and} \tag{13′}$$
$$k_r = k_r(W_r/R). \tag{14′}$$

The three capital endowment Equations (17), (18) and (19) become:

$$k_u L_u + k_i L_i + k_r L_r = K_D. \tag{17′}$$

The domestic factor income will be:

$$Y = W_r L + RK_D \tag{22'}$$

6.3. Working of the Model

The equilibrium values of W_i, V_i and h are obtained from Equations (5), (6), (7). All the factor prices R, W_r, R_F can be determined from Equations (8c), (10c) and (11), given W_u^*. Thus, we get optimum capital intensities k_u, k_i, k_r, k_F from Equations (12′) to (14′) and (15). Now, Equation (9c) yields equilibrium P_i, given V_i and R. We get equilibrium L_i from Equation (2) and L_F from Equation (23).

Now, equilibrium L_u and L_r can be determined from Equations (16) an (17′). This is shown in Figure 3. The MM curve is obtained from Equation (16). Its slope is given by $(dL_r/dL_u)_{MM} = -(W_u^*/W_r)$. Thus, the MM curve is negatively sloped and it shifts when $W_u, W_r, L, L_F, W_i, L_i$ are changed. Equation (17′) gives the NN curve, whose slope is given by $(dL_r/dL_u)_{NN} = -(k_u/k_r)$. This is also negatively sloped and shifts when K_D, K_i, L, L_i are changed. The NN curve is steeper than the MM curve as we assume that the UFS is more capital intensive than the RS in value terms[14]. The intersection of the two curves determines equilibrium (L_u^*, L_r^*).

Now, the equilibrium level of urban unemployment is obtained from Equation (21). The level of output X_u, X_r, X_F are obtained from Equations (1) to (3) and (4). Finally, Y is determined from Equation (22′).

6.4. Comparative Static Effects

6.4.1. Change in P_F

Output subsidization to the foreign enclave raises P_F. As a result, R_F rises, given W_r (See Equation (11)). Thus, (W_r/R_F) falls and so also k_F. Equation (20) shows that L_F rises, given K_F. Thus, the MM curve shifts downward. This leads to a rise in L_u and fall in L_r (See the Appendix A.3). Now, Equation (16) implies that U must rise when L_u rises, given W_u, W_i, L_i, W_r.

Thus, L_u and U become higher and L_i remains fixed. So, μ rises.

Equation (22′) shows that there is no effect on Y since rise in P_F does not affect W_r, R.

The above result leads to the following proposition:

Proposition 6. Expansion of the foreign enclave through output subsidy leads to a rise in urban unemployment and the degree of urbanisation However, its effects on domestic factor income is nil.

6.4.2. Change in K_F

If foreign capital stock is increased, K_F will rise. This raises L_F, given k_F. Thus, we get the same effect on unemployment, degree of urbanisation and on domestic factor income, as obtained in Proposition 5.

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[14] This implies that $W_r k_u > W_u^* k_r$.

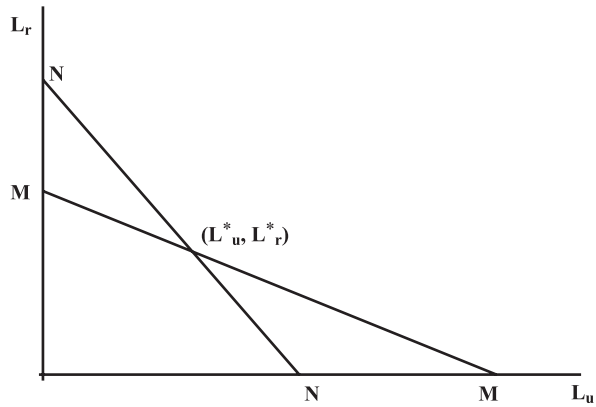

Figure 3

7. Conclusion

This paper presents a model with special emphasis on foreign enclave, informal sector and urban unemployment. The simultaneous existence of the urban informal sector and urban unemployment is explained in terms of the efficiency wage theory. Like, Young-Miyagiwa (1987), we assume a rural foreign enclave. This paper examines the impact of expansion of foreign enclave on urban unemployment, degree of urbanisation and domestic factor income. Our model differs form the existing models on foreign enclave in two respects: here, foreign enclave expands either through the output subsidy given to this sector or through the enlargement of foreign capital; and different types of capital mobility among the sectors are assumed in this paper.

The comparative static analysis shows that if foreign enclave expands either through the price subsidy or through the increase in the stock of foreign capital, urban unemployment falls when capital is purely non-shiftable and it rises if capital is shiftable perfectly or imperfectly. This is opposite to that of YM (1987). We get the same result in Dutta Chowdhury (1993) and Gupta (1994). However, our model differs from them with respect to the mode of expansion of foreign enclave and nature of capital mobility. The paper also shows that domestic factor income does not change even if foreign enclave expands when capital is perfectly or imperfectly mobile. Only when capital is purely non-shiftable, such expansion has positive effect on domestic factor income. We also find that the degree of urbanisation falls if domestic capital is purely non-shiftable or it is mobile between urban informal sector and rural sector or it is mobile within the urban sector. In the case of perfect mobility of domestic capital or mobility of capital between the urban formal sector and the rural sector, the degree of urbanisation rises.

Appendix

A.1. The total differentials of Equations (16) and (11) are given by:

$$(L - L_r - L_F)dW_r - W_r(L'_r + L'_F)dR_F = 0 \tag{B.1}$$
$$C_{FL}dW_r + C_{FK}dR_F = dP_F \tag{B.2}$$

In the Matrix Form we can write,

$$\begin{bmatrix} (L - L_r - L_F) & -W_r(L'_r + L'_F) \\ C_{FL} & C_{FK} \end{bmatrix} \begin{bmatrix} dW_r \\ dR_F \end{bmatrix} = \begin{bmatrix} 0 \\ dP_F \end{bmatrix}$$

$$Here, \Delta_1 = (L - L_r - L_F)C_{FK} + W_r C_{FL}(L'_r + L'_F) > 0, \text{ since, } L'_r, L'_F > 0$$
$$dW_r = 1/\Delta_1 \left[W_r(L'_r + L'_F)dP_F\right] > 0$$
$$and\ dR_F = 1/\Delta_1 \left[(L - L_r - L_F)dP_F\right] > 0$$

A.2. Total differentials of Equations (16) and (17) are given by:

$$W_i dL_i + W_r dL_r = -W_r dL_F \tag{B.3}$$
$$k_i dL_i + k_r dL_r = 0. \tag{B.4}$$

In the Matrix Form we can write,

$$\begin{bmatrix} W_i & W_r \\ k_i & k_r \end{bmatrix} \begin{bmatrix} dL_i \\ dL_r \end{bmatrix} = \begin{bmatrix} -W_r dL_F \\ 0 \end{bmatrix}$$

Here,

$$\Delta_2 = W_i k_r - W_r k_i > 0\ (Assumed)$$
$$dL_i = -1/\Delta_2 \left[k_r W_r dL_F\right] < 0$$
$$dL_r = 1/\Delta_2 \left[W_r k_i dL_F\right] > 0$$

A.3. The total differentials of Equations (16) and (17a) are given by:

$$W_u^* dL_u + W_r dL_r = -W_r dL_F$$
$$k_u dL_u + k_r dL_r = 0$$
$$Here,\ \Delta_3 = W_u^* k_r - W_r k_u < 0\ (Assumed)$$
$$dL_u = -1/\Delta_3 \left[k_r W_r dL_F\right] > 0$$
$$dL_r = 1/\Delta_3 \left[W_r k_u dL_F\right] < 0$$

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