Journal of Development Economics 41 (1993) 137–151. North-Holland

Rural–urban migation, informal sector and development policies
A theoretical analysis

Manash Ranjan Gupta*

Jadavpur University, Calcutta, India

Received September 1991, final version received March 1992

A theoretical model of rural–urban migration has been developed with special reference to the informal sector. The wage rate and employment in the informal sector are determined endogenously. The paper shows the simultaneous existence of open unemployment and informal sector in the urban area in migration equilibrium. The effects of alternative subsidy policies on unemployment and welfare of the workers are studied.

1. Introduction

A substantial portion of the urban population in a less developed economy like India is employed in the informal sector, i.e. outside the organized labour market,[1] because the organized sector is unable to absorb the entire urban labor force. Hence the industrial development strategy must give proper weight to the development of the informal sector.

Development policies like capital subsidy policy and price subsidy policy to the informal sector have been often recommended.[2] However, the policy prescriptions should be based on a theoretical framework in terms of which the functioning of the informal sector can be analysed. A few theoretical models of informal sector are available in the literature.[3] Stiglitz (1982) and Grinols (1991) consider the urban informal sector in small sections in their papers while extending their basic models in various directions. Stiglitz (1982) was interested in evaluating the shadow wage rate in the urban formal sector and, in this context, he shows that the presence of the informal sector

Correspondence to: Manash Ranjan Gupta, Arabinda Sarani, Basunagar, P.O. Madhyamgram, Dt. North 24 Parganas, West Bengal, India.

*The paper is substantially revised in the light of the comments of the two referees to whom I an indebted. Remaining errors are solely mine.

[1]See the empirical studies by Mazumder (1976), Romatet (1983) etc.

[2]See Weeks (1975).

[3]See Stark (1982), Datta Chaudhuri (1989), Sarkar and Ghosh (1989), Quibria (1988), Stiglitz (1982), Grinols (1991), Fields (1975) etc.

makes no difference to his results in its absence if the marginal worker in the informal sector makes zero contribution to net national product. Grinols (1991) was interested in modelling the general equilibrium effects of foreign capital inflow in less developed economies and shows that an increase in foreign capital leads to an increase in labour and lower wages in the informal sector. However, neither of the two models consider the effects of subsidy policies to the informal sector.

Some other theoretical papers consider the capital subsidy policy to the informal sector. Sarkar and Ghosh (1989) have shown that a policy which reduces the rate of interest paid by the informal sector also tends to reduce aggregate output and employment in the industrial sector. Datta Chaudhuri (1989) has also come to the similar conclusion. However, they did not study the effects of the policies on the welfare of the society.

The above mentioned models which determine the wage rate and the size of the informal sector endogenously have used the framework of a dual economy model with Harris–Todaro (1970) type of rural–urban migration. The urban sector has been divided into two subsectors – a formal subsector and an informal subsector. The migrants not getting jobs in the formal sector are automatically employed in the informal sector, and, in migration equilibrium, there does not exist any open unemployment in the urban sector.

The model developed in the present paper is also a Harris–Todaro (1970) type of dual economy model with the urban sector consisting of a formal subsector and an informal subsector. But in this model, there exists open urban unemployment even in migration equilibrium in spite of the existence of the informal sector. Hence in such a model, we can study the effects of alternative development policies of the informal sector on the open unemployment in the urban sector.

Note that in a Harris–Todaro (1970) type of dual economy model, there are four different income-groups within the working class: (i) the workers of the urban formal sector who receive the highest wage, (ii) the workers of the urban informal sector receiving a lower wage, (iii) the unemployed persons in the urban sector who do not earn anything, and (iv) the rural workers earning a different wage rate. Hence there exists a positive degree of inequality in the distribution of income of the labourers. The social welfare function must incorporate this; the welfare measure of Sen (1974) is an appropriate measure in this context. In this paper, we study the effects of different policies on the welfare of the society using the welfare measure suggested by Sen (1974). It appears that the price subsidy to the urban informal sector improves the social welfare; but the capital subsidy policy to the urban informal sector worsens the welfare of the society.

Even while analysing the effects of alternative policies on the level of open unemployment, we get some interesting results. Price-subsidy policy to the

informal sector reduces unemployment, while the capital subsidy policy to it worsens unemployment. A wage-subsidy policy to the urban formal sector reduces the level of open unemployment there, but a price or wage subsidy policy to the rural sector aggravates the problem. The result is completely opposite to that in the Harris–Todaro (1970) model.

Section 2 describes the model. The working of the model and the general equilibrium analysis of the model are presented in section 3. The effects of alternative policies on unemployment and on the welfare of the society are analysed in section 4. Concluding remarks are made in section 5.

2. The model

The economy considered in this model is an internationally closed dual economy consisting of an urban sector and a rural sector. The urban sector is further divided into two subsectors – a formal sector producing manufactured goods and an informal sector producing intermediate goods used as input in the formal sector.[4] Labour is the common input to all the sectors, and the urban sectors are dependent on the migrant labour force from the rural sector.

2.1. Urban formal sector

The formal subsector of the urban sector produces a manufactured good using labour, the intermediate product and capital as inputs. It purchases the intermediate product from the informal sector. The capital stock used in this sector is owned by the sector itself.[5] The production function of this sector is

$$Y_1 = F_1(L_1, R, K_1), \tag{1}$$

where Y_1 is the level of output, L_1 is the level of employment, R is the amount of intermediate input and K_1 is the capital stock. The production function satisfies the following assumptions: (i) diminishing returns to scale, (ii) positive and diminishing marginal productivity of each input, and (iii) separability in terms of the arguments.[6]

Total cost, C_1, is given by

$$C_1 = (\bar{W}_1 - S_1)L_1 + P_1 R, \tag{2}$$

[4]All the theoretical models have made the assumption because it has empirical base. However, there is a substantial literature on intermediate inputs in the theory of international trade. For example, see Batra (1973), Casas (1972), Batra and Casas (1973) etc.

[5]Note that the formal sector does not lend capital to anybody.

[6]It means that $\partial^2 Y_1/\partial L_1 \partial K = \partial^2 Y_1/\partial L_1 \partial R = \partial^2 Y_1/\partial K \partial R = 0$. The purpose of this restrictive assumption is explained in footnote 9.

where $\bar{W}_1$ is the institutionally fixed wage rate in the urban formal sector and S_1 is the wage-subsidy per unit of employment in that sector. P_1 is the relative price of the informal sector's product (intermediate input) in terms of the formal sector's product.

The equilibrium conditions of the profit-maximizing firm are the following:

$$\partial Y_1/\partial L_1 = \bar{W}_1 - S_1, \tag{3}$$

$$\partial Y_1/\partial R = P_1. \tag{4}$$

Solving eqs. (3) and (4) and using the assumptions of the production function, we can obtain the following input demand functions:

$$L_1 = L_1(S_1) \quad \text{with} \quad L_1^1(S_1) > 0, \tag{3a}$$

$$R = R(P_1) \quad \text{with} \quad R^1(P_1) < 0. \tag{4a}$$

Here eq. (3a) is the employment function in the urban formal sector and eq. (4a) is the demand function for intermediate input.

Note that the values of Y_1, L_1, R and P_1 are determined within the model. But S_1 is a policy variable.

2.2. *The informal sector*

We consider the informal sector in the urban area with the following characteristics:

(i) It depends on those members of the labour force who are migrants from the rural areas and are not getting jobs in the urban formal sector.
(ii) It produces intermediate goods for the formal sector.
(iii) The level of output of the informal sector is demand determined. There is a downward linkage between the formal and the informal sector which implies that the informal sector lives or dies with the formal sector.
(iv) It borrows capital from the monopolistic, unorganized capital market at very high rates of interest.

$R(P_1)$ is the demand function for the informal sector's product, and for the sake of simplicity we assume the linear form

$$R(P_1) = r_1 - r_2 P_1, \tag{5}$$

where r_1 and r_2 are two positive constants, Price subsidy to the informal sector lowers the value of r_2.

Let Lu_1 be the level of employment in the informal sector and v its wage rate, expressed in terms of its product. So vLu_1 is the total labour cost in the informal sector.

Ku is the capital[7] borrowed by the informal-sector firm at the rate of interest i. Here

$$i=\alpha+G(Ku). \tag{6}$$

We assume that $G'(Ku)$ and $G''(Ku)$ are positive. This means that the informal-sector firm can get an additional loan only at the cost of a higher interest rate. This implies imperfection in the credit market.

Note that the rate of interest is also measured in terms of the informal sector's product, and hence the total cost of the informal-sector firm, Cu, assuming that capital and labour are the only two inputs, is given by

$$Cu=vLu_1+(G(Ku)+\alpha)Ku. \tag{7}$$

The production function of the informal sector is

$$Yu=Fu(Ku, Lu_1) \tag{8}$$

and it satisfies all the standard properties satisfied by the production function of the formal sector.

The objective of the representative informal-sector firm is to maximize profit, $Yu-Cu$, and the first-order conditions are:

$$\partial Yu/\partial Lu_1=v, \tag{9}$$

$$\partial Yu/\partial Ku=G(Ku)+\alpha+Ku.G'(Ku). \tag{10}$$

Solving eqs. (9) and (10), we can obtain the demand function for labour,

$$Lu_1=Lu_1(v) \quad \text{with} \quad Lu_1'(v)<0, \tag{9a}$$

and the demand function for capital,

$$Ku=Ku(\alpha) \quad \text{with} \quad Ku'(\alpha)<0. \tag{10a}$$

Here α is a policy variable. If the government adopts a credit subsidization policy to the informal sector, α takes a lower value.

In equilibrium, output of the informal sector is equal to the demand for its product. Hence,

$$Yu=R(P_1). \tag{11}$$

Now using eqs. (5), (8), (9a), (10a) and (11), we have

$$Fu(Ku(\alpha), Lu_1(v))=r_1-r_2P_1. \tag{11a}$$

[7]Here capital means working capital.

2.3. The rural sector

The rural sector produces food using labour as the only factor of production and the production function is given by

$$Y_2 = F_2(L_2), \tag{12}$$

where Y_2 and L_2 are level of output and employment in the rural sector. We assume that $F_2'(L_2) > 0$ and $F_2''(L_2) < 0$.

We assume marginal productivity pricing of labour in the rural sector. Let W_2 be the rural wage rate in terms of food. Hence,

$$W_2 = F_2'(L_2) + S_2. \tag{13}$$

Here S_2 is the wage subsidy per unit of employment in the rural sector.

2.4. Marketable surplus

Since the rural sector produces food and the urban people consume it, government ensures subsidized supply of food to the urban people. Here $(L_1 + Lu_1 + Lu_2)$ is the size of the urban labour force (population) where Lu_2 is the unemployed workers in the urban sector. Let X be the targeted amount of food the government supplies to the urban people and let it be positively related to the size of the urban labour force. Mathematically,

$$X = X(L_1 + Lu_1 + Lu_2) \quad \text{with} \quad X'(\cdot) > 0. \tag{14}$$

The rural sector has a supply function of marketable surplus, Z, which is a positive function of the price of food (in terms of the formal sector's product) and its level of production. Mathematically,

$$Z = Z(P_2, Y_2) \tag{15}$$

with $\partial Z/\partial P_2 > 0$ and $\partial Z/\partial Y_2 > 0$. In equilibrium,

$$X = Z. \tag{16}$$

Let the entire labour force of the economy be equal to unity. Hence,

$$L_1 + Lu_1 + Lu_2 + L_2 = 1. \tag{17}$$

Now using eqs. (12), (14), (15), (16) and (17), we have

$$X(1 - L_2) = Z(P_2, F_2(L_2)). \tag{16a}$$

The increase in government subsidy to the food-grains trading implies that

given the buying price of food of the urban people, it is possible to raise the selling price of food that the rural producers face, i.e. P_2.

Hence P_2 is a policy variable. Its value is determined by the government's decision of determining the volume of subsidy. So the variable through which adjustment $X=Z$ is ensured is L_2.

2.5. Rural–urban migration

The rural–urban migration mechanism is of the Harris–Todaro (1970) type. In migration equilibrium

$$\frac{\bar{W}_1 L_1 + P_1 v L u_1}{L_1 + L u_1 + L u_2} = P_2 W_2. \tag{18}$$

Here $L_1/(L_1+Lu_1+Lu_2)$ is the probability that the representative rural migrant gets a job in the urban formal sector; $Lu_1/(L_1+Lu_1+Lu_2)$ is the probability that he gets a job in the informal sector. So the left-hand side of eq. (18) is the expected urban wage rate of the rural migrant and P_2W_2 is his actual wage rate in the rural sector. These are expressed in terms of the formal sector's product. There is rural–urban migration so long as the expected urban wage rate exceeds the actual rural wage rate; and the reverse migration takes place in the opposite case. So in migration equilibrium, the expected urban wage rate of a rural migrant is equal to his actual wage rate in the rural sector.

3. General equilibrium

3.1. Working of the model

How does the model work? That is, how are the values of the endogenous variables determined? Here the endogenous variables are Y_1, L_1, R, P_1, Lu_1, v, Ku, Lu_2, Yu, Y_2, L_2 and W_2. The policy variables are S_1, S_2, α, r_2 and P_2. The government determines the values of the policy variables; and then the equilibrium values of the endogenous variables are determined. Once the government announces a value of S_1, value of L_1 is determined from eq. (3a). Then eqs. (1) and (4a) determine the values of Y_1 and R in terms of P_1. When the government determines the values of α and r_2, Ku is determined from eq. (10a). Again, eqs. (9a) and (8) determine the values of Lu_1 and Yu in terms of v. Then eq. (11a) determines P_1 in terms of v. Now the government announces a value of P_2. Then eqs. (16a) and (13) determine the values of L_2 and W_2 in terms of v. At last, the equilibrium value of v is determined by eq. (18).

3.2. Determination of P_1, v and Lu_2

Now we explain how the equilibrium values of v, P_1 and Lu_2 are

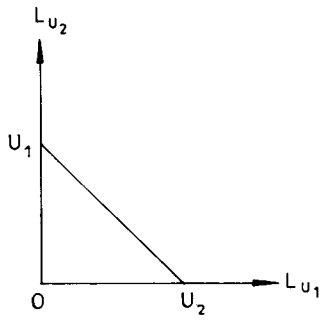

Fig. 1

determined given S_1, S_2, r_2, α and P_2; and for this, we consider eqs. (17), (16a), (11a) and (18).

First, we consider eq. (16a). Here the left-hand side is a negative function of L_2, and the right-hand side given P_2, is a positive function of L_2. Hence (16a) is satisfied at some value of L_2, say $\bar{L}_2$. Given S_1, L_1 is fixed. Hence for $L_2 = \bar{L}_2$, from eq. (17), it is clear that $(Lu_1 + Lu_2)$ is given. Suppose that eq. (16a) is satisfied at $(Lu_1 + Lu_2) = A$. In fig. 1, it is shown by the negatively sloped straight line, u_1u_2.

If S_1 rises, then L_1 rises. Given L_2, $(Lu_1 + Lu_2)$ falls. Hence the u_1u_2 straight line shifts downwards when the wage subsidy to the urban formal sector is increased.

Again a rise in P_2 leads to a fall in the value of L_2 if eq. (16a) is to be satisfied. So given S_1 and hence given L_1, $(Lu_1 + Lu_2)$ rises. So the u_1u_2 straight line shifts upwards when the price subsidy to the rural sector is increased.

We now turn to explain how the equilibrium values of v and P_1 are determined. First, we consider eq. (11a). Given α and r_2, it shows the alternative combinations of P_1 and v at which output of the informal sector is equal to the demand for its product. So the curve which represents eq. (11a) in a diagram with two axes showing P_1 and v is called the 'supply–demand equality' (SDE) curve. Note that $\partial Fu/\partial Lu_1 > 0$ and $Lu_1'(v) < 0$. So a rise in v leads to a fall in Yu. In order to keep eq. (11a) undisturbed, P_1 should rise. So the SDE curve slopes positively (see fig. 2).

If the government increases the price subsidy to the informal sector, r_2 takes a lower value. This raises the right-hand side of eq. (11a) given P_1. So the left-hand side of this equation should rise and this is possible if v falls. So the SDE curve shifts towards the P_1-axis when the price subsidy to the informal sector is increased.

If the government increases the capital subsidy to the informal sector, α takes a lower value. Then Ku rises and hence the left-hand side of eq. (11a)

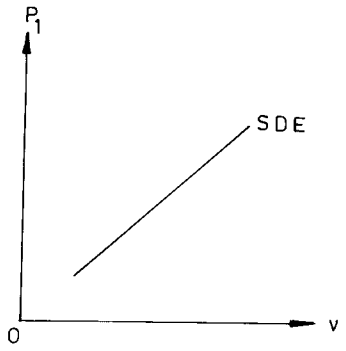

Fig. 2

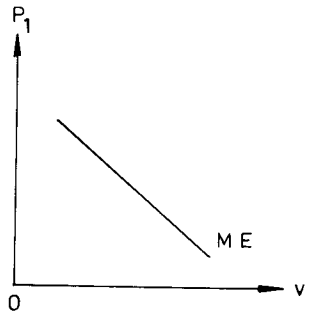

Fig. 3

rises given v. Hence the right-hand side of eq. (11a) should rise and this is possible if P_1 falls. So the SDE curve shifts towards the v-axis when the government increases the capital subsidy to the informal sector.

Now we consider eq. (18). Using eqs. (13), (18) and (17) we have

$$\frac{\bar{W}_1 L_1 + P_1 v L u_1(v)}{1 - L_2} = (F_2'(L_2) + S_2) P_2. \tag{18a}$$

Given the values of the policy variables – S_1, S_2 and P_2 – L_1 and L_2 remain unchanged. So $P_1 v L u_1(v)$ is given. A rise in P_1 causes a fall in $v L u_1(v)$. Let $\Theta = -(\partial L u_1 / \partial v)\,(v / L u_1)$ be the wage elasticity of employment in the informal sector. We assume that $\Theta < 1$. Hence a fall in $v L u_1$ implies a fall in v. So P_1 and v vary inversely. The curve showing the alternative combinations of P_1 and v at which migration equilibrium is maintained is called 'migration equilibrium' (ME) curve. It slopes negatively if $\Theta < 1$ (see fig. 3).

If the government increases the wage subsidy to the formal subsector of

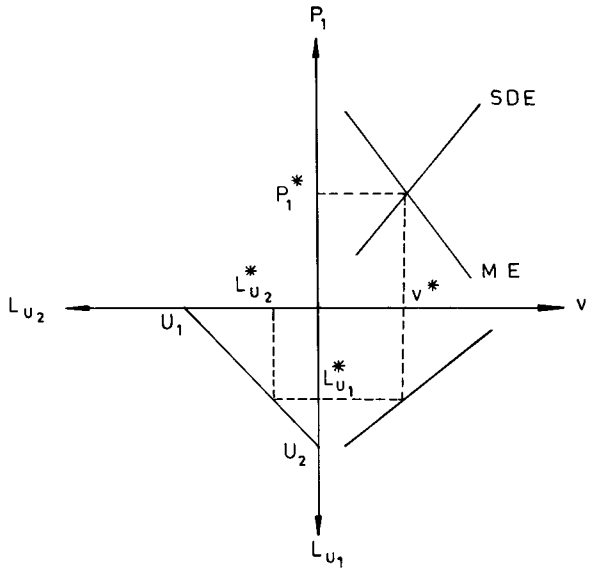

Fig. 4

the urban sector, L_1 rises. So $P_1 v L u_1$ falls. Given v, this implies a fall in P_1. So the ME curve shifts downwards when S_1 rises.

When the wage subsidy to the rural sector, S_2, is increased, the right-hand side of eq. (18a) rises. Given S_1 and P_2, and L_1 and L_2 remain unchanged. So $P_1 v L u_1$ rises. Given v, this leads to a rise in P_1. So the ME curve shifts upward in this case.

When P_2 rises, L_2 falls. So $F_2'(L_2)$ rises and hence the right-hand side of eq. (18a) rises. Also $(1-L_2)$ rises. So $P_1 v L u_1$ should rise; and given v, P_1 should rise. So the ME curve shifts upward when the price subsidy to the rural sector is increased.

Now look at fig. 4. We combine the SDE curve and ME curve in the first quadrant. The equilibrium values of v and P_1 are determined by the point of intersection of the two curves. P_1^* is the equilibrium price of the informal sector's product and v^* is the equilibrium wage rate of the informal sector. The fourth quadrant shows the negatively sloped demand curve for labour in the informal sector; and $L^* u_2$ is the equilibrium level of open unemployment.

4. Policies

4.1. Effects on unemployment

If an additional price subsidy is given to the informal sector, then r_2 takes

a lower value. So the SDE curve shifts upward. But no other curve shifts, so P_1^* rises, v^* falls, and L^*u_2 falls. This leads to the following proposition:

Proposition 1. If an additional price subsidy is given to the informal sector, at the new equilibrium level the price of the informal sector's product rises, and the wage rate of the informal sector and the level of unemployment fall.

An increase in capital subsidy to the informal sector implies a fall in the value of α. Hence the SDE curve shifts downwards and no other curve shifts. So P_1^* falls; v^* rises and L^*u_2 rises. So we can prove the following proposition.

Proposition 2. If an additional capital subsidy is given to the informal sector, at the new equilibrium the price of the informal sector's product falls, and the informal sector's wage rate and unemployment rise.

So the effects of a price subsidy to the informal sector are completely opposite to the effects of a capital subsidy to that sector.

When S_2 rises, the ME curve shifts upward. But the SDE curve and u_1u_2 straight line do not shift. So P_1^* and v^* take higher values, and L^*u_2 rises. So one can prove the following proposition.

Proposition 3. If an additional wage subsidy is given to the rural sector, the new equilibrium is characterized by a higher price of the informal sector's product, a higher wage rate of the informal sector and a higher level of unemployment.

If S_1 rises, the ME curve shifts downwards and the u_1u_2 straight line shifts downwards. But the SDE curve does not shift. So P_1^*, v^* and L^*u_2 fall. So we can establish the following proposition.

Proposition 4. If an additional wage subsidy is given to the formal subsector of the urban sector, in the new equilibrium the price of the informal sector's product, the wage rate of the informal sector and the level of unemployment take lower values.

If P_2 rises, the u_1u_2 straight line of the fourth quadrant in fig. 4 shifts upward, and the ME curve in the first quadrant shifts upwards. But the SDE curve does not shift. So P_1^*, v^* and L^*u_2 rise. This leads to the following proposition.

Proposition 5. If an additional price subsidy is given to the rural sector, the new equilibrium is characterized by a higher price of the informal sector's

product, a higher wage rate of the informal sector and a higher level of unemployment.

So in this model an increase in the wage subsidy to the urban sector lowers the equilibrium level of unemployment in the urban sector. But an increase in the wage or price subsidy to the rural sector raises the unemployment level. This is completely opposite to the policy conclusions available in the existing literature.[8,9]

4.2. Effects on welfare

The income distribution of the workers is given by the following:

Wage rate:	$\bar{W}_1$	P_2W_2	vP_1	0
Employment:	L_1	L_2	Lu_1	Lu_2

Because of the fact that wage rates in different sectors are different, there is a positive Gini-coefficient, M, of the income distribution of the workers.

The social welfare function should incorporate this measure of inequality and so we consider the welfare measure of Sen (1974). This is given by

$$U = E(1-M), \tag{19}$$

where E is the average income of all the workers. Note that

$$E = \bar{W}_1L_1 + P_1vLu_1 + P_2W_2L_2. \tag{20}$$

Now, using eqs. (17), (18) and (20), we have

$$E = P_2W_2. \tag{20a}$$

Also,

$$EM = L_1L_2(\bar{W}_1 - W_2P_2) + L_1Lu_1(\bar{W}_1 - P_1v) + L_1Lu_2\bar{W}_1 + L_2Lu_1(P_2W_2 - P_1v) + L_2Lu_2W_2P_2 + Lu_1Lu_2P_1v. \tag{21}$$

Then using eq. (21), we get

[8]See Basu (1980), Bhagwati and Srinivasan (1974) and Harris and Todaro (1970).

[9]No doubt, the results depend on the simplifying assumption that the marginal product of a factor in any of the two urban sectors is independent of the amount of the other factors. The intention is to supply counter-examples to conventional views; and if this assumption is made the above-mentioned results can be derived without using any other technical or economic conditions. If this assumption is dropped, we need some other sufficient conditions for this result to be true.

$$EM = P_2W_2(Lu_1 + Lu_2) + (\bar{W}_1 - P_2W_2)L_1L_2 - P_1vLu_1(1 - Lu_2). \quad (21a)$$

Now using eqs. (17), (19) and (21a) we have

$$U = P_2W_2(L_1 + L_2) - (\bar{W}_1 - P_2W_2)L_1L_2 + P_1vLu_1(1 - Lu_2). \quad (22)$$

Now we consider the effect of different subsidy policies on the welfare of the workers. First, we consider the effect of a change in r_2 on U given P_2, S_1, S_2 and α. Given S_1, L_1 is unchanged. Again, given S_2 and P_2, L_2 is unchanged. Hence W_2 does not change. $\bar{W}_1$ is institutionally fixed. Also from eq. (18a) it is clear that P_1vLu_1 does not change when S_1, S_2 and P_2 do not change. Hence a change in the value of r_2 causes a change in Lu_2 only. Here,

$$dU/dr_2 = -P_1vLu_1\left(\frac{dLu_2}{dr_2}\right)$$

Note that it is clear from Proposition 1 that $(dLu_2/dr_2) > 0$. So $(dU/dr_2) < 0$. Hence we can prove the following proposition.

Proposition 6. An increase in the price subsidy to the informal sector improves the welfare of the society.

When we consider the effect of a change in the value of α on U given S_1, S_2, P_2 and r_1, we find that only Lu_2 changes when α changes. So

$$dU/d\alpha = -P_1vLu_1.(dLu_2/d\alpha).$$

From Proposition 2, we know that $(dLu_2/d\alpha) < 0$. Hence $(dU/d\alpha) > 0$. This leads to the following proposition.

Proposition 7. If an additional capital subsidy is given to the informal sector, social welfare is decreased.

So from the viewpoint of the increase in social welfare, a price subsidy policy to the urban informal sector is always superior to a capital subsidy policy to that sector. We do not analyse the effects of the other subsidy policies on the social welfare in this paper because their effects are indeterminate.[10]

5. Conclusion

This paper analyses the working of an informal sector – determination of

[10]Interested readers may check it or can obtain it from the author on request.

the wage rate and the price of the product – in a Harris–Todaro (1970) type of model of rural–urban migration. Its speciality lies in explaining the simultaneous existence of the informal sector and open unemployment in the urban areas. The existing models of informal sector could not explain this.[11] Either from the viewpoint of reduction in unemployment or from the viewpoint of increase in social welfare, a capital subsidy policy to the informal sector can not be supported, though such a policy has been advocated by many economists without any theoretial analysis. However, the paper supplies theoretical justifications of the price subsidy policy to the informal sector. The theoretical analysis, though subject to various limitations, is definitely an improvement over those existing in the literature.

Some of the results related to the effects of subsidy policies on unemployment run counter to those generated by the standard Harris–Todaro migration model. An increase in the subsidy given to rural employment leads to an increase in urban unemployment, while the standard model predicts a decrease. An increase in the subsidy given to employment in the urban formal sector leads unambiguously to a decrease in urban unemployment, while the standard model admits the possibility of an increase. The key characteristic of the model causing these differences is that the government can effectively control the size of the urban labour force by controlling the amount of the availability of food in the urban sector. A policy that leads to more food production, such as a subsidy to rural employment, causes the amount of food available for urban consumption to expand. So the urban labour force expands. A subsidy to urban formal sector employment raises the demand for labour. But it does not affect the availability of food and hence the urban labour force. So the urban unemployment is reduced.

Although this theory does not apply to many small, relatively open economies in Africa and Latin America that are heavy importers of food, it seems at least applicable to a relatively closed economy like India. The government of India has put special emphasis on self-sufficiency in food production and on the public procurement of food grains with price subsidy to ensure the required availability of food to the urban consumers.

[11]However, Fields (1975) explains the existence of open unemployment in the presence of wage flexibility in the informal sector by positing a trade-off between informal sector employment and case of search for formal sector jobs.

Appendix: Derivation of eq. (21a) from eq. (21)

$$\begin{aligned} EM &= L_1L_2(\bar{W}_1 - W_2P_2) + L_1Lu_1(\bar{W}_1 - P_1u) + L_1L_2\bar{W}_1 \\ &\quad + L_2Lu_1(P_2W_2 - P_1v) + L_2Lu_2W_2P_2 + Lu_1Lu_2P_1v \qquad (21) \\ &= \bar{W}_1L_1(L_2 + Lu_1 + Lu_2) + P_2W_2L_2(Lu_1 + Lu_2 - L_1) \end{aligned}$$

$$+P_1vLu_1(Lu_2-L_2-L_1)$$

$$=(\bar{W}_1L_1+P_2W_2L_2)(Lu_1+Lu_2)+(\bar{W}_1-P_2W_2)L_1L_2$$

$$+P_1vLu_1Lu_2-P_1vLu_1(1-Lu_1-Lu_2)$$

$$=(\bar{W}_1L_1+P_2W_2L_2+P_1vLu_1)(Lu_1+Lu_2)$$

$$(\bar{W}_1-P_2W_2)L_1L_2-P_1vLu_1(1-Lu_2)$$

$$=P_2W_2(Lu_1+Lu_2)+(\bar{W}_1-P_2W_2)L_1L_2-P_1vLu_1(1-Lu_2). \quad (21a)$$

References

Basu, K., 1980, Optimal policies in dual economies, Quarterly Journal of Economics 95.

Batra, R.N., 1973, Studies in the pure theory of international trade (Macmillan, London).

Batra, R.N. and F.R. Casas, 1973, Intermediate products and the pure theory of international trade: A neo-Heckscher–Ohlin framework, American Economic Review 63, June.

Bhagwati, J.N. and T.N. Srinivasan, 1974, On reanalysing the Harris–Todaro model: Policy rankings in the case of sector-specific sticky wages, American Economic Review 64.

Casas, F.R., 1972, The theory of intermediate products, technical change and growth, Journal of International Economics 2, May.

Datta Chaudhuri, T., 1989, A theoretical analysis of the informal sector, World Development 17, no. 3, 351–355.

Fields, G., 1975, Rural–urban migration, urban employment and job-search activity in less developed countries, Journal of Development Economics 2, no. 2, 165–188.

Grinols, E., 1991, Unemployment and foreign capital: The relative opportunity costs of domestic labour and welfare, Economica 58, 107–121.

Gupta, M.R., 1988, Migration, welfare, inequality and shadow wage, Oxford Economic Papers 40, 477–486.

Harris, J.R. and M.P. Todaro, 1970, Migration, unemployment and development: A theoretical analysis, American Economic Review 60, 126–142.

Mazumder, D., 1976, The urban informal sector, World Development 4, no. 8, 655–679.

Papola, T.S., 1981, Urban informal sector in a developing economy (Vikas Publishing House).

Quibria, M.G., 1988, Migration, trade unions, and the informal sector: A note on Calvo, International Economic Review 29, no. 3, 557–563.

Romatet, E., 1983, Calcutta's informal sector: Theory and reality, Economic and Political Weekly 18, no. 50, 2115–2128.

Sarkar, A. and M. Ghosh, 1989, A model of the informal sector, I.S.I. working paper.

Sen, A.K., 1974, Real national income, Review of Economic Studies.

Sen, A.K., 1974, Informal bases of alternative welfare appoaches: Aggregation and income distribution, Journal of Public Economics 4.

Stark, O., 1982, On modelling the informal sector, World Development 10, no. 5, 413–416.

Stiglitz, J.E., 1982, The structure of labour markets and shadow prices in LDC's, in: Sabot, ed., Migration and the labour market in developing countries (Westview Press, Boulder, CO) 13–64.

Weeks, J., 1975, Policies for expanding employment in the informal urban sector of developing countries, International Labour Review 3.