Economic Liberalization and Informal Wage in a Small Open Economy: Does Capital Mobility count?

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Abstract: Empirical evidence suggests that the size of the informal sector in the developing countries has increased considerably during the liberalized economic regime. The present paper purports to analyze the consequences of economic reforms on the wellbeing of the informal sector workforce using a three-sector general equilibrium model with two informal sectors. The theoretical analysis finds that different liberalized policies produce diverse effects on the informal wage and that these results are independent of the nature of capital mobility between the informal and the formal sectors. It also shows that labour market reforms, contrary to the common wisdom, are likely to produce favourable effects on the informal wage.

Keywords: Informal sector, formal sector, informal wage, economic reforms, capital mobility, general equilibrium model.

JEL classification: F10, J10, J13, I28.

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1. Introduction

Informal labour market characterized by competitive wage formation rather than unionized process of negotiations has emerged as an important institution in the entire developing world. It is beyond any doubt that the informal sector plays a very significant role in employment in developing countries constituting at least 70 per cent of total employment of the working population (Agenor 1996). In case of India this figure is over 90 per cent if one includes agriculture. The informal economy absorbs surplus labour, provides income-earning opportunities for the poor, provides goods and services unavailable in the formal sector, and helps in maintaining a low cost of living by providing cheaper sources of food and services. Early research on the informal sector showed that its primary role was to provide a livelihood for the urban poor while later studies showed that informal economy fulfils other crucial roles that aid overall economic development.

The ongoing process of economic reforms has increased significantly the role played by informal sectors in determining the pattern of employment in the developing countries. Many of the developing countries have been facing substantial adjustment costs in implementing economic liberalization programs, particularly in the employment front. Empirical evidence suggests that in South Africa and in many of the Latin American and other developing countries, trade liberalization during 1990s was associated with falling employment and hence economic insecurity for the formal sector labour force (ILO (2006)). Reformatory policies contract the formal manufacturing sector and drive labour out into the informal segment of the labour market. Empirical studies e.g. Bhalotra (2002), Dev (2000), ILO (2006) and Leite (2006) have reported that the size of the informal sector in the developing countries has increased considerably in the post-reform period. But the expanding informal sector has not been able to absorb the huge number of retrenched workers from the formal sector. The consequence has been a steep rise in the level of open unemployment in many of the developing economies.

When the size of the informal sector in the developing countries is increasing at a brisk pace, it is important to know how the liberalized economic policies have affected the working conditions and welfare of the informal sector workforce. As economic wellbeing of the

workers and wage earnings are strongly correlated, the issue boils down to the study of the consequences of economic reforms on the informal sector wage. There are not enough direct empirical evidences as yet in understanding clearly the direction of movement of the informal sector wages in response to economic reforms. While Bhalotra (2002) and National Sample Survey (NSS), various issues data for informal manufacturing for 1989-1990 and 1994-1995, state that the real wage in the informal manufacturing sector has increased in the period of reforms, empirical studies of Khan (1998) and Tendulkar et al. (1996) have found that the incidence of poverty has increased in India in the post-reform period. As informal sector workers belong to the poorer section of the population, an increase in poverty implies deterioration in their wage earnings. Besides, Leite et al. (2006) have reported a significant decrease in average real wage for informal workers in South Africa during 2000-2004.

The enormous theoretical literature on the informal sector[1] has not adequately addressed this aspect. An important exception in this context is Marjit (2003) who has examined the outcome of trade liberalization on the informal wage using a three-sector general equilibrium model with two informal sectors. In his model one of the two informal sectors produces a non-traded input for the formal sector and capital is mobile only between the two informal sectors of the economy. Marjit (2003) has found that trade liberalization may increase the informal sector wage under certain conditions. He argues that the positive effect on the informal wage would be strengthened if capital mobility between the informal and the formal sectors is allowed.

It should be pointed out that economic reforms involve not only removal of the protectionist policy but also liberalized investment policy resulting in inflows of foreign capital and also structural reforms like deregulating the labour market. But, liberalization of labour laws is a very much politically sensitive issue. It is apprehended by the trade unions that any relaxation of labour laws will lead to general wage reductions of the poorer group of the working population engaged in the informal sector of the economy[2]. Two other important aspects in this context

[1] This includes works of Chandra and Khan (1993), Gupta (1993, 1997), Beladi and Yabuuchi (2001), Kar and Marjit (2001), Chaudhuri (2000, 2003), Chaudhuri and Mukherjee (2002), Chaudhuri et al. (2006), etc. But, none of these papers has exclusively examined the consequences of economic reforms on the wage rate and the wellbeing of the informal sector labour force and the role of the capital mobility between the formal and the informal sectors in this context.

[2] Many of the developing countries, including India, are now seriously thinking in terms of implementing labour market reforms. But, not much progress has been made so far toward implementation of such a highly politically sensitive measure and hence the outcome of this

are the empirical findings that the informal sector firms mainly produce intermediate inputs for the formal sector firms under the system of subcontracting and that capital is mobile between these two types of firms[3]. Three pertinent questions, therefore, are as follows: (i) Do different liberalized policies produce dissimilar effects on the informal wage? (ii) How far is the general apprehension that labour market reforms depress the informal wage valid? (iii) Do the consequences of economic reform really hinge on the nature of capital mobility between the formal and the informal sectors of the economy?

The present paper purports to provide answers to the above questions in terms of a three-sector general equilibrium model with two informal sectors. It finds that different liberalized policies produce dissimilar effects on the informal wage and that these results are independent of the nature of capital mobility between the formal and the informal sectors. It also shows that the fear of the trade unions surrounding the possible impact of labour market reforms does not have sound theoretical foundation. Labour market reform in fact is likely to increase the competitive informal wage and improve the wellbeing of the poorer section of the working class. Finally, as different liberalized policies produce incongruent consequences on the informal wage, the paper argues that unless a proper balance among different policies compatible to the internal institutional, technological and trade related characteristics is made drastic implementation of economic measures may produce adverse effects on the informal wage and further exacerbate the already fragile economic situations of the informal sector workers.

2. The Model

We consider a small open economy with three sectors: two traded sectors and one non-traded sector. Sector 1 produces a primary agricultural commodity, X_1, using labour and land. Sector 2 produces a non-traded input for sector 3 using labour and one of the two inputs: land and capital. Finally, sector 3 (formal sector) may be either an agro-based industry or a manufacturing industry that uses labour, capital and the product of sector 2 to produce a final industrial commodity. So, we consider two cases depending on the nature of good produced by sector 3. In the former case, sector 2 produces a commercial agricultural crop for the formal sector using only labour and land while in the latter it produces a manufacturing

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on the unionized wage cannot be statistically established a priori. However, it follows logically that such a move is likely to lower the unionized wage. See footnote 6 for details.

[3] See Papola (1981), Romatet (1983), Sethuraman (1984), Sethuraman and Maldonado (1992) etc. in this context.

intermediate input with the help of labour and capital. However, for constructing a general model from which the two cases arise as sub-cases we assume that sector 2 uses both land and capital in its production. Sector 1 is the export sector while sector 3 is the import-competing which is protected by an import-tariff.

The per-unit requirement of the intermediate input is assumed to be technologically fixed in sector 3.[4] Let us now assume that labour in the formal sector earns a contractual wage, W^*, while the wage rate in the two informal sectors, W, is market determined. So, labour is perfectly mobile between the two informal sectors but is imperfectly mobile between sector 3 and the rest of the economy. Land (capital) is perfectly mobile between sector 1 (sector 3) and sector 2 if sector 2 uses land (capital) while it is specific to sector 1 (sector 3) in the case where sector 2 produces a manufacturing (an agricultural) input for sector 3. The capital stock of the economy includes both domestic and foreign capital and these are perfect substitutes. Production functions exhibit constant returns to scale with diminishing marginal productivity to each factor. All inputs are fully employed. Owing to our small open economy assumption we consider the prices of the commodities of sectors 1 and 3 to be given internationally while the price of the non-traded input produced in sector 2 is endogenously determined. Finally, commodity 1 is chosen as the numeraire.

The following symbols will be used in the formal presentation of the model.

L = fixed number of workers in the economy;
N = economy's given endowment of land;
K = capital stock of the economy (domestic plus foreign);
X_i = output of the i th sector, i = 1,2,3;

[4] It rules out the possibility of substitution between the non-traded input and other factors of production in sector 3. Although this is a simplifying assumption, it is not totally unrealistic. In industries like shoe making and garments, large formal sector firms farm out their production to small informal sector firms under the system of subcontracting. So the production is done in the informal sector while labeling, packaging and marketing are done by the formal sector firms. One pair of shoes produced in the informal sector does not change in quantity when it is marketed by the formal sector as a final commodity. Thus there remains a fixed proportion between the use of the intermediate good and the quantity of the final commodity produced and marketed by the formal sector. On the other hand, if sector 2 produces an agricultural product like sugarcane or cotton, there might exist a fixed-proportion between the quantity of input used and the quantity of output produced in the sugar mills/textile firms. It may be noted that papers like Chaudhuri (2003), Marjit (2003) and Chaudhuri et al. (2006) have also made this assumption.

j_i = amount of the j-th input employed in the i-th industry, $j = L, N, K$; and, $i = 1,2,3$;

a_{Li} = labour-output ratio in the ith sector, $i = 1,2,3$;

a_{Ni} = land-output ratio in the ith sector, $i = 1,2$;

a_{Ki} = capital-output ratio in the ith sector, $i = 2,3$;

a_{23} = amount of good 2 required to produce 1 unit of good 3 (technologically given);

θ_{ji} = distributive share of the j-th input in the i-th industry, $j = L, N, K$; and, $i = 1,2,3$;

λ_{ji} = proportion of the j-th input employed in the i-th industry, $j = L, N, K$; and, $i = 1,2,3$;

$P_1 = 1$ (commodity 1 is the numeraire);

P_3 = world price of good 3 (given internationally);

P_2 = domestically determined price of good 2;

P_3^* = domestic or tariff-inclusive price of commodity 3;

t = ad-valorem rate of tariff on the import of commodity 3;

W = competitive wage rate in the informal sectors;

W^* = institutionally given wage rate in the formal sector;

R = return to land;

r = return to capital;

^ = proportional change.

The general equilibrium structure of the model is as follows.

Given the assumption of perfectly competitive markets the usual price-unit cost equality conditions relating to the three sectors of the economy are given by the following three equations, respectively.

$$Wa_{L1} + Ra_{N1} = 1 \quad (1)$$

$$Wa_{L2} + Ra_{N2} + ra_{K2} = P_2 \quad (2)$$

$$W^* a_{L3} + ra_{K3} + P_2 a_{23} = P_3(1+t) \quad (3)$$

Full utilization of labour, land and capital imply the following three equations, respectively.

$$a_{L1}X_1 + a_{L2}X_2 + a_{L3}X_3 = L \quad (4)$$

$$a_{N1}X_1 + a_{N2}X_2 = N \quad (5)$$

$$a_{K2}X_2 + a_{K3}X_3 = K; \quad (6)$$

The output of the informal sector, X_2, is used entirely for producing X_3, so that the supply of X_2 is circumscribed by its total demand by sector 3. The demand – supply equality condition is given by

$$X_2 = X_2^D = a_{23}X_3 \quad (7)$$

Here, a_{23} is assumed to be a constant. This means that to produce one unit of the formal sector's product a_{23} units of the non-traded input is required.[5]

There are seven endogenous variables in the system: W, R, r, P_2, X_1, X_2 and X_3. The policy parameters are: t, W^* and K. There are seven independent equations (1) – (7). The price system consists of equations (1) – (3). The model does not satisfy the decomposition property. The working of the model is as follows. W, R and r are obtained from equations (1) – (3) as functions of P_2 as W^*, P_3 and t are given exogenously. Once factor prices are determined factor-coefficients, a_{ji} s, are also determined as functions of P_2. Then from (4) – (6), X_1, X_2 and X_3 are obtained. Finally, P_2 is found from (7). Once P_2 is obtained the equilibrium values of all the endogenous variables are now found in terms of the parameters of the model.

3. Comparative Static Exercises

In this section of the paper we will analyze the consequences of different liberalized economic policies on the informal sector wage. Liberalization involves both inflow of foreign capital as well as reduction of protection of domestic industries and structural reforms like deregulating the labour market. According to the conventional wisdom, an inflow of foreign capital in a developing economy should raise the competitive wage through an expansion of the formal sector of the economy and drawing labour away from the informal sector while removal of the protectionist policy is expected to produce exactly the opposite effects. On the other hand,

[5] See footnote 4 in this context.

labour market reform that lowers the unionized wage[6] in the formal sector is apprehended to produce adverse impact on the informal wage and deteriorate welfare of the poorer section of the working population engaged in the informal sector of the economy. Although, different liberalized policies are undertaken concurrently in a developing economy, to fix our ideas we may consider their effects one by one. We shall, however, discuss intuitively the net outcome of these policies on the informal sector wage, if carried out simultaneously.

3.1 *Economic liberalization and informal wage*

Totally differentiating equations (1) – (3), using the envelope conditions and solving by Cramer's rule, the following expressions can be derived easily.

$$\hat{W} = -(\frac{\theta_{N1}}{|\theta|})[(\theta_{K3} + \theta_{23}\theta_{K2})\hat{P}_2 - \theta_{K2}T\hat{t} + \theta_{K2}\theta_{L3}\hat{W}^*] \tag{8}$$

$$\hat{R} = (\frac{\theta_{L1}}{|\theta|})[(\theta_{K3} + \theta_{23}\theta_{K2})\hat{P}_2 - \theta_{K2}T\hat{t} + \theta_{K2}\theta_{L3}\hat{W}^*] \tag{9}$$

$$\hat{r} = \frac{(\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})}{|\theta|}(T\hat{t} - \theta_{23}\hat{P}_2 - \theta_{L3}\hat{W}^*) \tag{10}$$

where:

$T = (\frac{t}{1+t}) > 0$; and,

$$|\theta| = \theta_{K3}(\theta_{L!}\theta_{N2} - \theta_{N1}\theta_{L2}) \tag{11}$$

Now differentiating equations (4) – (6), using (8) – (10) and solving the following expressions can be obtained.

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[6] The firms in the urban (manufacturing) sector have well-organized trade unions. One of the most important roles of the labour unions is to bargain with the respective employers in respect of the betterment of the working conditions. Through offer of negotiation, threat of strike, actual strike etc. they exert pressure on the employers (firms) in order to secure higher wages, reduced hours of work, share in profits and other benefits. Bhalotra (2002) has noted that in India before the initiation of economic reforms organized workers in large firms were been able to reap wages higher than the supply price of labour due to the job security and minimum wage legislations. The higher the bargaining strength of the unions the higher is expected to be the extent of benefits that can be wrested through collective-bargaining. Now if the government undertakes measures e.g. partial or complete ban on resorting to strikes by the trade unions, reformation of employment security laws to curb union power, the unions' power to mark up wages over the supply of labour decreases. The consequence would, therefore, be a fall in the unionized wage. Thus, labour market reform in the present context may be captured in terms of an exogenous reduction in the unionized wage.

$$\hat{X}_2 = (\frac{1}{|\lambda|})[(\lambda_{L1}\lambda_{K3}A_4 + \lambda_{N1}\lambda_{K3}A_1 + \lambda_{L3}\lambda_{N1}A_7)\hat{P}_2 - (\lambda_{L1}\lambda_{K3}A_5 + \lambda_{N1}\lambda_{K3}A_2 + \lambda_{L3}\lambda_{N1}A_8)\hat{t}$$
$$+ (\lambda_{L1}\lambda_{K3}A_6 + \lambda_{N1}\lambda_{K3}A_3 + \lambda_{L3}\lambda_{N1}A_9)\hat{W}^* + \lambda_{L3}\lambda_{N1}\hat{K}] \quad (12)$$

and;

$$\hat{X}_3 = (\frac{1}{|\lambda|})[(\lambda_{L1}\lambda_{N2}A_7 - \lambda_{L1}\lambda_{K2}A_4 - \lambda_{L2}\lambda_{N1}A_7 - \lambda_{N1}\lambda_{K2}A_1)\hat{P}_2$$
$$- (\lambda_{L1}\lambda_{N2}A_8 - \lambda_{L1}\lambda_{K2}A_5 - \lambda_{L2}\lambda_{N1}A_8 - \lambda_{N1}\lambda_{K2}A_2)\hat{t}$$
$$+ (\lambda_{L1}\lambda_{N2}A_9 - \lambda_{L1}\lambda_{K2}A_6 - \lambda_{L2}\lambda_{N1}A_9 - \lambda_{N1}\lambda_{K2}A_3)\hat{W}^* + (\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1})\hat{K}] \quad (13)$$

where:

$$|\lambda| = (\lambda_{L1}\lambda_{N2}\lambda_{K3} - \lambda_{L2}\lambda_{N1}\lambda_{K3} + \lambda_{L3}\lambda_{N1}\lambda_{K2}) \quad (14)$$

$$A_1 = (\frac{1}{|\theta|})[(\theta_{K3} + \theta_{23}\theta_{K2})\bar{\lambda}_{Li}\bar{S}^k_{Lj} - \theta_{23}(\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})(\lambda_{L2}S^2_{LK} + \lambda_{L3}S^3_{LK})];$$

$$A_2 = (\frac{T}{|\theta|})[\theta_{K2}\bar{\lambda}_{Li}\bar{S}^k_{Lj} - (\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})(\lambda_{L2}S^2_{LK} + \lambda_{L3}S^3_{LK})];$$

$$A_3 = (\frac{1}{|\theta|})[\theta_{K2}\theta_{L3}\bar{\lambda}_{Li}\bar{S}^k_{Lj} - (\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})\{\theta_{L3}\lambda_{L2}S^2_{LK} + \lambda_{L3}S^3_{LK}(\theta_{L3} + \theta_{K3})\}];$$

$$\bar{\lambda}_{Li}\bar{S}^k_{Lj} = (\lambda_{L1}S^1_{LN} + \lambda_{L2}S^2_{LN} + \lambda_{L2}S^2_{LK}\theta_{N1}) > 0;$$

$$A_4 = (\frac{1}{|\theta|})[(\theta_{K3} + \theta_{23}\theta_{K2})\bar{\lambda}_{Ni}\bar{S}^k_{Nj} + \theta_{23}(\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})\lambda_{N2}S^2_{NK}];$$

$$A_5 = (\frac{T}{|\theta|})[\theta_{K2}\bar{\lambda}_{Ni}\bar{S}^k_{Nj} + (\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})\lambda_{N2}S^2_{NK}];$$

$$A_6 = (\frac{\theta_{L3}}{|\theta|})[\theta_{K2}\bar{\lambda}_{Ni}\bar{S}^k_{Nj} + (\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})\lambda_{N2}S^2_{NK}]; \quad (15)$$

$$\bar{\lambda}_{Ni}\bar{S}^k_{Nj} = (\lambda_{N1}S^1_{NL} + \lambda_{N2}S^2_{NL} + \lambda_{N2}S^2_{NK}\theta_{L1}) > 0;$$

$$A_7 = (\frac{1}{|\theta|})[(\theta_{K3} + \theta_{23}\theta_{K2})(S^2_{KL}\theta_{N1} - S^2_{KN}\theta_{L1})\lambda_{K2} - \theta_{23}(\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})\bar{\lambda}_{Ki}\bar{S}^k_{Kj}];$$

$$A_8 = (\frac{T}{|\theta|})[\theta_{K2}\lambda_{K2}(\theta_{N1}S^2_{KL} - \theta_{L1}S^2_{KN}) - (\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})\bar{\lambda}_{Ki}\bar{S}^k_{Kj}];$$

$$A_9 = (\frac{1}{|\theta|})[\theta_{L3}\theta_{K2}\lambda_{K2}(\theta_{N1}S^2_{KL} - \theta_{L1}S^2_{KN}) - (\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})\bar{\lambda}_{Ki}\bar{S}^k_{Kj}\bar{\theta}_{L3}];$$

$$\bar{\lambda}_{Ki}\bar{S}^k_{Kj} = [\lambda_{K2}(S^2_{KL} + S^2_{KN}) + \lambda_{K3}S^3_{KL}] > 0; \text{ and,}$$

$$\bar{\lambda}_{Ki}\bar{S}^k_{Kj}\bar{\theta}_{L3} = [\lambda_{K3}S^3_{KL}(\theta_{L3} + \theta_{K3}) + \theta_{L3}\lambda_{K2}(S^2_{KL} + S^2_{KN})] > 0$$

We now define S^i_{jk} s. Here S^i_{jk} is the degree of substitution between factors in sector i, i = 1,2,3. For example, $S^1_{LL} \equiv (W/a_{L1})(\partial a_{L1}/\partial W)$, $S^1_{LN} \equiv (R/a_{L1})(\partial a_{L1}/\partial R)$ etc. $S^i_{jk} > 0$ for $j \neq k$; and, $S^i_{jj} < 0$. We note that as the production functions are homogeneous of degree one, the factor coefficients, a_{ji} s would be homogeneous of degree zero in the factor prices. Therefore, the sum of elasticities for any factor of production in any sector with respect to factor prices must be zero. For example, for labour in sector 1 we have $(S^1_{LL} + S^1_{LN}) = 0$. All other mathematical terms have already been defined in section 2 immediately before the formal presentation of the model.

Differentiating equation (7) and using (12) and (13) it is easy to check[7] that the stability condition in the market for the non-traded input is as follows.

$$(\frac{\Delta}{|\lambda|}) < 0\,; \tag{16.1}$$

$$\text{where: } \Delta = [A_7(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) - \lambda_{L1}A_4 - \lambda_{N1}A_1] \tag{16.2}$$

Now differentiating (7), using (12) and (13) and simplifying one gets:

$$\begin{aligned}\hat{P}_2 = (\frac{\hat{t}}{\Delta})[A_8(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) - A_5\lambda_{L1} - A_2\lambda_{N1}] \\ -(\frac{\hat{W}^*}{\Delta})[A_9(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1}) - A_6\lambda_{L1} - A_3\lambda_{N1}] \\ -(\frac{\hat{K}}{\Delta})(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1})\end{aligned} \tag{17}$$

Finally, using (17) and colleting terms equation (8) can be rewritten as follows.

$$\begin{aligned}\hat{W} = -(\frac{\theta_{N1}\hat{t}}{|\theta|})[\{A_8(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) - A_5\lambda_{L1} - A_2\lambda_{N1}\}(\frac{\theta_{K3} + \theta_{23}\theta_{K2}}{\Delta}) + \theta_{K2}T] \\ +(\frac{\theta_{N1}\hat{W}^*}{|\theta|})[\{A_9(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1}) - A_6\lambda_{L1} - A_3\lambda_{N1}\}(\frac{\theta_{K3} + \theta_{23}\theta_{K2}}{\Delta}) - \theta_{K2}\theta_{L3}] \\ +(\frac{\theta_{N1}}{|\theta|})(\theta_{K3} + \theta_{23}\theta_{K2})(\frac{\hat{K}}{\Delta})(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1})\end{aligned} \tag{18}$$

[7] This has been derived in Appendix II.

We are all set to derive and state our results. Depending on the nature of the non-traded input produced in sector 2 and the nature of capital mobility between the informal and the formal sectors two sub-cases arise.

Sub-case I: Sector 2 produces an agricultural input for the formal sector and hence uses land and does not use capital. In this case there is complete mobility of land between the two informal sectors while capital is a specific input in sector 3. These imply that $a_{K2}, \lambda_{K2}, \theta_{K2} = 0; \lambda_{K3} = 1;$ and, $S^2_{KL}, S^2_{KN}, S^2_{LK}, S^2_{NK,} S^2_{KK} = 0$. Sectors 1 and 2 together form a HOSS (Hechscher-Ohlin subsystem).

We assume that sector 2 is more labour-intensive than sector 1. The rationale behind this assumption becomes quite clear if one considers rice and cotton (or jute) as the two agricultural commodities. The production of rice involves less labour per unit of land vis-à-vis the processing of raw cotton/jute for delivery to the textile industry (formal sector). Even at the cultivation stage both products require the same labour/land ratio, cotton/jute must go through another process of conversion before it can be sent to the textile firms. This additional phase of production is likely to make the output of sector 2 labour-intensive.[8] This means that $|\theta|, |\lambda| < 0.$

Using the above specifications from (18) it is easy to prove the following proposition.[9]

Proposition 1: When the informal sector produces an agricultural input for the formal manufacturing sector the informal wage (i) decreases due to removal of the protectionist policy; (ii) rises following labour market reform; and, (iii) increases owing to an inflow of foreign capital.

Proposition 1 can intuitively be explained as follows. We note that sectors 1 and 2 together form a HOSS. Now, an inflow of foreign capital lowers the rate of return to capital as the supply of capital rises given its demand. Sector 3 expands and demands more non-traded input which in turn raises the price of the input, P_2. This produces a Stolper-Samuelson effect in the HOSS leading to an increase in the competitive informal wage and a decrease in the return to land as sector 2 is more labour-intensive relative to sector 1. On the other hand, a reduction in import tariff reduces the domestic price of commodity 3 and leads to a

[8] See Marjit (1991) for details.

[9] This has been proved in Appendix II.

contraction of this sector. The demand for the non-traded input falls given its supply resulting in a decrease in its price. The informal sector wage, W, now falls following a Stolper-Samuelson effect in the HOSS. Finally, a policy of labour market reform that takes the form of a reduction in the unionized wage, W^*, helps the formal manufacturing sector (sector 3) to save on labour input and enables it to expand which in turn increases its demand for the non-traded input. This raises the price of the non-traded input which in turn raises the informal wage once again following a Stolper-Samuelson effect in the HOSS.

We may consider a special case where sector 2 is land-intensive relative to sector 1 and the proportion of the workforce employed in the formal sector is significantly low. All these suggest that: $|\theta|, |\lambda| > 0; \Delta < 0;$ and, $\lambda_{L3} \cong 0.$ Using these specifications from (18) the following proposition can be easily proved.[10]

Proposition 2: In the case where the non-traded sector produces an agricultural input the informal wage (i) rises following a reduction in import tariff; (ii) falls due to labour market reform; and, (iii) rises owing to an inflow of foreign capital if and only if $|\theta|, |\lambda| > 0;$ and, $\lambda_{L3} \cong 0.$

Under the necessary and sufficient condition that $|\theta|, |\lambda| > 0;$ and, $\lambda_{L3} \cong 0$, the policy changes produce exactly the opposite effects on the informal wage to what we have derived in proposition 1. Policy consequences on the price of the non-traded good remain unaltered. But, the price change and the consequent Stolper-Samuelson effect would make the informal wage to move in the opposite direction as the informal sector (sector 2) is now land-intensive. It is worthwhile to mention that Marjit (2003) has considered this case and obtained the counterintuitive effect of a reduction in import tariff on the informal sector wage.

Let us now turn to analyze the other sub-case.

Sub-case II: Sector 2 produces a non-traded manufacturing input for the formal sector. So it uses capital and not land. Land is now specific to sector 1 while capital is perfectly mobile between sectors 2 and 3. All these imply that $a_{N2}, \lambda_{N2}, \theta_{N2} = 0; \lambda_{N1} = 1;$ and, $S^2_{NL}, S^2_{NN}, S^2_{LN}, S^2_{NK,} S^2_{KN} = 0$. It is sensible to assume that the formal sector is more capital-intensive vis-à-vis the non-traded sector (sector 2) in both physical and value terms.

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[10] This has been proved in appendix II.

Using the above stipulations and equation (18) the following proposition can now be established.

Proposition 3: In the case where the non-traded informal sector produces a manufacturing input for the formal sector the informal wage (i) decreases due to removal of the protectionist policy; and, (ii) increases owing to an inflow of foreign capital. On the other hand, a policy of labour market reform raises the competitive informal wage if: $(\lambda_{L2}\theta_{L2}\theta_{K3} \geq \theta_{K2}(\theta_{23} + \theta_{K3})\lambda_{L3})$.

We explain proposition 2 in the following fashion. A policy of trade liberalization lowers the domestic price of commodity 3 and leads to a contraction of this sector. Sector 3 now demands less capital which in turn lowers the return to capital, r. The demand for the non-traded input also falls which consequently lowers its price, P_2. Following the contraction of sector 3, sector 2 also contracts as its output is used in fixed proportion in the former. Now a fall in r implies that producers in both the manufacturing sectors use more (less) capital-intensive (labour-intensive) techniques of production than before. Labour is released by these two sectors which now goes to sector 1 pressing down the competitive informal wage. On the other hand, an inflow of foreign capital leads to a decrease in r and hence an increase in P_2 so as to satisfy the zero profit condition for sector 3 (equation 3). As the capital stock of the economy swells up, both the capital-using sectors expand. It raises the demand for labour in the two manufacturing sectors, making less labour available to sector 1 and hence exerts an upward pressure on the informal wage. Finally, a decrease in the unionized wage makes it possible for the formal sector to save on labour input and raises the effective price of this commodity that the producers face. This leads to an expansion of this sector. An expansion of sector 3 raises the demand for the non-traded input. The price of the non-traded input, P_2, rises as a consequence. The demand for capital also rises in this sector and so would be the return to capital. So capital moves out of sector 2 to sector 3. This raises the return to capital in sector 2. Given P_2, an increase in r implies a decrease in the informal wage, W (see equation (2)). But, as P_2 has increased it effectively produces a Stolper-Samuelson effect in the two manufacturing sectors and exerting an upward pressure on W (note that sector 2 is labour-intensive vis-à-vis sector 3 in value sense). Thus, there are two opposite effects on the informal wage, W. The positive effect on W is stronger than the negative effect under the sufficient condition as stated in the proposition.

4. *Policy implications and concluding remarks*

Developing countries have been vigorously implementing liberalization policies in trade and investment for the last one and a half decades or so. But, they have been facing enormous adjustment costs in their endeavor in implementing such policies, especially in the employment front. Empirical evidence points out that the size of the informal sector has expanded significantly at the expense of the formal sector and that the problem of unemployment has increased over the liberalized regime. This paper has developed a three-sector general equilibrium model with informal sectors and a non-traded input with a view to examine the consequences of different liberalized policies on the informal wage. This analysis is extremely important as more than 70 per cent of the workforce in the developing countries is employed in the informal sector with wage incomes below or just above the poverty line. The theoretical analysis has found that trade liberalization, except in a very special case, produces depressing effect on the informal wage while inflows of foreign capital and/or structural reforms like deregulating the labour market are likely to produce favourable effects on the wage earnings of the poor workers. The latter result is extremely crucial as it explains why labour market reform should form an integral constituent of the liberalized economic package in the liberalizing countries. Furthermore, these results do not hinge on the nature of the capital mobility between the formal and informal sectors and, therefore, are robust. So, removal of the protectionist policy, which aims at reduction of commodity market distortion, a common characteristic of the developing countries, must be undertaken very cautiously as it is likely to hurt the interest of the poorer group of the workforce. On the other hand, investment and labour market reforms should be encouraged. Therefore, the liberalizing countries should not attempt in implementing all reforms at a very brisk pace, without pre-calculating their possible outcomes. A proper balance among various policies should be made considering the institutional, technological and trade related characteristics in order to protect the interests of the poor informal sector workers. Making this balance is utterly essential for attaining the ILO's (2006) objective of promotion of decent work for all.

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Appendices:

Appendix I: Derivation of stability condition in the market for the non-traded input

As commodity 2 is internationally non-traded its market must clear domestically through adjustments in its price, P_2.

The stability condition in the market for commodity 2 requires that

$(d(X_2^D - X_2)/dP_2) < 0$. This implies around equilibrium, initially, $X_2^D = X_2$. Thus,

$$((\hat{X}_2^D / \hat{P}_2) - (\hat{X}_2 / \hat{P}_2)) < 0. \quad \text{(A.1)}$$

Now the demand for the non-traded input is given by

$X_2^D = a_{23} X_3$. Differentiating this equation one gets

$\hat{X}_2^D = \hat{X}_3$. Using (13) one can find:

$$(\frac{\hat{X}_3}{\hat{P}_2}) = (\frac{1}{|\lambda|})(\lambda_{L1}\lambda_{N2}A_7 - \lambda_{L1}\lambda_{K2}A_4 - \lambda_{L2}\lambda_{N1}A_7 - \lambda_{N1}\lambda_{K2}A_1) \quad \text{(A.2)}$$

On the other hand, from (12) it follows that:

$$(\frac{\hat{X}_2}{\hat{P}_2}) = (\frac{1}{|\lambda|})(\lambda_{L1}\lambda_{K3}A_4 + \lambda_{N1}\lambda_{K3}A_1 + \lambda_{L3}\lambda_{N1}A_7) \quad \text{(A.3)}$$

Using (A.1) – (A.3) we find the following stability condition for equilibrium in the market for commodity 2.

$$(\frac{1}{|\lambda|})[A_7(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) - \lambda_{L1}A_4 - \lambda_{N1}A_1] < 0;$$

i.e.

$$(\frac{\Delta}{|\lambda|}) < 0; \quad \text{(16.1)}$$

$$\text{where: } \Delta = [A_7(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) - \lambda_{L1}A_4 - \lambda_{N1}A_1] \quad \text{(16.2)}$$

Appendix II: Two possible cases

Depending on the nature of the non-traded input produced by sector 2 and the nature of capital mobility between the formal and the informal sectors the following two cases are possible.

Sub-case I: Sector 2 produces an agricultural input for the formal sector and hence uses land and does not use capital. These imply that

$$a_{K2}, \lambda_{K2}, \theta_{K2} = 0; \lambda_{K3} = 1; \text{and}, S^2_{KL}, S^2_{KN}, S^2_{LK}, S^2_{NK,} S^2_{KK} = 0. \qquad \text{(A.4)}$$

As per our assumption that sector 2 is more labour-intensive than sector 1 we have $|\theta|, |\lambda| < 0.$

Using (A.4), the expressions presented in (14) and (15) can be reduced to:

$$|\lambda| = (\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1}) < 0; \qquad \text{(A.5)}$$

$$\left.\begin{aligned}
&A_1 = (\frac{1}{|\theta|})[\theta_{K3}(\lambda_{L1}S^1_{LN} + \lambda_{L2}S^2_{LN}) - \theta_{23}(\theta_{L1}\theta_{N2} - \theta_{N1}\theta_{L2})\lambda_{L3}S^3_{LK}] < 0;\\
&A_2 = -[(T/\theta_{K3})\lambda_{L3}S^3_{LK}] < 0;\ A_3 = -[(\lambda_{L3}/\theta_{K3})S^3_{LK}(\theta_{L3} + \theta_{K3})] < 0;\\
&A_4 = (\frac{1}{|\theta|})[\theta_{K3}(\lambda_{N1}S^1_{NL} + \lambda_{N2}S^2_{NL})] < 0;\ A_5 = A_6 = 0;\\
&A_7 = -[(\theta_{23}/\theta_{K3})S^3_{KL}] < 0;\ A_8 = -(S^3_{KL}/\theta_{K3}) < 0;\\
&A_9 = -[(S^3_{KL}/\theta_{K3})(\theta_{K3} + \theta_{L3})] < 0.
\end{aligned}\right\} \qquad \text{(A.6)}$$

Using (A.4) – (A.6) it is easy to check from (16.2) that: $\Delta > 0.$

With the help (A.5) and (A.6) and simplifying from (17) one can write:

$$\hat{P}_2 = (\frac{\hat{t}}{\theta_{K3}\Delta})[-S^3_{KL}(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) + T\lambda_{L3}\lambda_{N1}S^3_{LK}]$$

$$(+) \qquad\qquad (-)$$

$$+ (\frac{\hat{W}^*}{\theta_{K3}\Delta})(\theta_{L3} + \theta_{K3})[S^3_{KL}(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1}) - \lambda_{L3}\lambda_{N1}S^3_{LK}]$$

$$(+) \qquad\qquad (-)$$

$$- (\frac{\hat{K}}{\Delta})(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) \qquad \text{(A.7)}$$

$$(+) \qquad\qquad (-)$$

From (A.7) we find that:

(i) $\hat{P}_2 < 0$ when $\hat{t} < 0$; (ii) $\hat{P}_2 > 0$ when $\hat{W}* < 0$; and, (iii) $\hat{P}_2 > 0$ when $\hat{K} > 0.$

Using (A.5) and (A.6) the expression (18) can be reduced to as follows.

$$\hat{W} = -(\frac{\theta_{N1}\hat{t}}{|\theta|\Delta})[-S^3_{KL}(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) + T\lambda_{L3}\lambda_{N1}S^3_{LK}]$$

$$(-)(+) \qquad\qquad (-)$$

$$-(\frac{\theta_{N1}\hat{W}^*}{|\theta|\Delta})(\theta_{L3} + \theta_{K3})[S^3_{KL}(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1}) - \lambda_{L3}\lambda_{N1}S^3_{LK}]$$

$$(-)(+) \qquad\qquad (-)$$

$$+(\frac{\theta_{N1}\theta_{K3}\hat{K}}{|\theta|\Delta})(\lambda_{L1}\lambda_{N2} - \lambda_{L2}\lambda_{N1} - \lambda_{L3}\lambda_{N1}) \qquad (A.8)$$

$$(-)(+) \qquad\qquad (-)$$

The following results are evident from (A.8).

(i) $\hat{W} < 0$ when $\hat{t} < 0$; (ii) $\hat{W} > 0$ when $\hat{W}^* < 0$; and, (iii) $\hat{W} > 0$ when $\hat{K} > 0$.

A special case:

We consider a special case where sector 2 is land-intensive relative to sector 1 and the proportion of the workforce employed in the formal sector is significantly low. These imply that:

$$|\theta|, |\lambda| > 0; \text{and, } \lambda_{L3} \cong 0. \qquad (A.9)$$

Using these specifications from (16.1) one finds that:

$$\Delta < 0 \qquad (A.10)$$

Now using (A.9) and (A.10) from (18) the following results are obtained: (i) $\hat{W} > 0$ when $\hat{t} < 0$; (ii) $\hat{W} < 0$ when $\hat{W}^* < 0$; and, (iii) $\hat{W} < 0$ when $\hat{K} > 0$. We should note that these results hold under the necessary and sufficient conditions that: $|\theta|$, $|\lambda| > 0; \Delta < 0$; and, $\lambda_{L3} \cong 0$.

Sub-case II: Sector 2 produces a non-traded manufacturing input for the formal sector. So it uses capital and not land. All these suggest that

$$a_{N2}, \lambda_{N2}, \theta_{N2} = 0; \lambda_{N1} = 1; \text{and, } S^2_{NL}, S^2_{NN}, S^2_{LN}, S^2_{NK,} S^2_{KN} = 0 \qquad (A.11)$$

Sector 3 is capital-intensive relative to sector 2 in both physical and value terms.

Using (A.11) the expressions presented in (11), (14) and (15) can be reduced to as follows.

$$\left|\theta\right| = -(\theta_{K3}\theta_{N1}\theta_{L2}) < 0; \tag{A.12}$$

$$\left|\lambda\right| = (\lambda_{K2}\lambda_{L3} - \lambda_{L2}\lambda_{K3}) < 0 \tag{A.13}$$

$$\left.\begin{aligned}
A_1 &= (\frac{1}{\left|\theta\right|})[(\theta_{K3} + \theta_{23}\theta_{K2})(\lambda_{L1}S^1_{LN} + \lambda_{L2}S^2_{LK}\theta_{N1}) - (\frac{\theta_{23}\left|\theta\right|}{\theta_{K3}})(\lambda_{L2}S^2_{LK} \\
&\qquad + \lambda_{L3}S^3_{LK})] < 0 \\
A_2 &= (\frac{T}{\left|\theta\right|})[\theta_{K2}(\lambda_{L1}S^1_{LN} + \lambda_{L2}S^2_{LK}\theta_{N1}) + \theta_{N1}\theta_{L2}(\lambda_{L2}S^2_{LK} + \lambda_{L3}S^3_{LK})] < 0; \\
A_3 &= (\frac{1}{\left|\theta\right|})[\theta_{K2}\theta_{L3}(\lambda_{L1}S^1_{LN} + \lambda_{L2}S^2_{LK}\theta_{N1}) + \theta_{N1}\theta_{L2}\{\theta_{L3}\lambda_{L2}S^2_{LK} \\
&\qquad + \lambda_{L3}S^3_{LK}(\theta_{L3} + \theta_{K3})\}] < 0; \\
A_4 &= (\frac{1}{\left|\theta\right|})[(\theta_{K3} + \theta_{23}\theta_{K2})S^1_{NL}] < 0; A_5 = (\frac{T\theta_{K2}S^1_{NL}}{\left|\theta\right|}) < 0; A_6 = (\frac{\theta_{L3}\theta_{K2}S^1_{NL}}{\left|\theta\right|}) < 0; \\
A_7 &= (\frac{1}{\left|\theta\right|})[(\theta_{K3} + \theta_{23}\theta_{K2})\theta_{N1}\lambda_{K2}S^2_{KL} + \theta_{N1}\theta_{23}\theta_{L2}(\lambda_{K2}S^2_{KL} + \lambda_{K3}S^3_{KL})] < 0; \\
A_8 &= (\frac{T}{\left|\theta\right|})[\theta_{K2}\theta_{N1}\lambda_{K2}S^2_{KL} + \theta_{N1}\theta_{L2}(\lambda_{K2}S^2_{KL} + \lambda_{K3}S^3_{KL})] < 0; \\
A_9 &= (\frac{1}{\left|\theta\right|})[\theta_{L3}\theta_{K2}\theta_{N1}\lambda_{K2}S^2_{KL} + \theta_{N1}\theta_{L2}\{\lambda_{K3}S^3_{KL}(\theta_{L3} + \theta_{K3}) + \theta_{L3}\lambda_{K2}S^2_{KL}\}] < 0;
\end{aligned}\right\} \tag{A.14}$$

Using (A.11) – (A.14), from (16.2) one finds that $\Delta > 0$.

Taking the help of (A.12) – (A.14) and collecting terms from (17) one can write

$$\hat{P}_2 = -(\frac{T\hat{t}}{\Delta|\theta|})[\lambda_{L1}\theta_{K2}(S^1_{LN} + S^1_{NL}) + \theta_{N1}(\lambda_{L2}S^2_{LK} + \lambda_{K2}S^2_{KL})$$

(+)(–) (+)

$$+ \theta_{N1}\theta_{L2}\{\lambda_{L3}S^3_{LK} + \lambda_{K3}S^3_{KL}(\lambda_{L2} + \lambda_{L3})\}]$$

(+)

$$+(\frac{\hat{W}*}{\Delta|\theta|})[\lambda_{L1}\theta_{L3}\theta_{K2}(S^1_{LN} + S^1_{NL}) + \theta_{N1}\theta_{L3}\lambda_{L2}(\lambda_{K2}S^2_{KL} + \lambda_{L2}S^2_{LK})$$

(+)(–) (+)

$$+ \theta_{N1}\theta_{L2}(\theta_{L3} + \theta_{K3})(\lambda_{L3}S^3_{LK} + \lambda_{K3}\lambda_{L2}S^3_{KL})] + (\frac{\hat{K}}{\theta_{L2}\Delta})(\lambda_{L2} + \lambda_{L3}) \qquad \text{(A.15)}$$

(+) (+)

From (A.15) it follows that:

(i) $\hat{P}_2 < 0$ when $\hat{t} < 0$; (ii) $\hat{P}_2 > 0$ when $\hat{W}* < 0$; and, (iii) $\hat{P}_2 > 0$ when $\hat{K} > 0$.

Finally, using (A.11) – (A.14) and simplifying equation (18) may be rewritten as follows.

$$\hat{W} = -(\frac{T\theta_{N1}\hat{t}}{\Delta|\theta|})[(\lambda_{L2} + \lambda_{L3})(\lambda_{K2}S^2_{KL} + \lambda_{K3}S^3_{KL}) + (\lambda_{L2}S^2_{LK} + \lambda_{L3}S^3_{LK})]$$

(+)(–) (+)

$$+(\frac{\hat{K}}{\Delta})(\lambda_{L2} + \lambda_{L3})$$

(+) (+)

$$+(\frac{\theta_{N1}\hat{W}*}{\Delta(|\theta|)^2})[\theta_{N1}\theta_{L3}\lambda_{K2}S^2_{KL}\{\theta_{L2}\theta_{K3}\lambda_{L2} - \theta_{K2}(\theta_{K3} + \theta_{23})\lambda_{L3}\}$$

(+)(+)

$$+(\theta_{N1}\theta_{L2}\lambda_{K3}S^3_{KL})\{(\theta_{K3} + \theta_{23}\theta_{K2})\theta_{K3}\lambda_{L2} + \theta_{L3}(\theta_{K3}\lambda_{L2} - \theta_{23}\theta_{K2}\lambda_{L3})\}$$

$$+(\theta_{N1}\theta_{L2}\theta_{L3}\theta_{K3}\lambda_{L2}S^2_{LK}) + \theta_{N1}\theta_{L2}\lambda_{L3}S^3_{LK}\{\theta_{K3} + \theta_{23}\theta_{K2}(\theta_{K3} + \theta_{23})\}] \qquad \text{(A.16)}$$

From (A.16) the following results trivially follow.

(i) $\hat{W} < 0$ when $\hat{t} < 0$; (ii) $\hat{W} > 0$ when $\hat{K} > 0$. Also, (iii) $\hat{W} > 0$ when $\hat{W}* < 0$ if $(\lambda_{L2}\theta_{L2}\theta_{K3} \geq \theta_{K2}(\theta_{23} + \theta_{K3})\lambda_{L3})$.