



Efficiency wage, bargained wage and search frictions in a two-sector general equilibrium model

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Abstract

The main purpose of this paper is to make integration between the job-matching theory and the efficiency-wage theory in a two-sector general equilibrium set-up. We consider two types of labour: high-skill and low-skill. We assume unemployment of both types of labour. We find that frictional wage cannot be determined within the firm if job destruction rate is exogenous. However, it may be determined within the firm if such rate is inversely related to the worker's efficiency. Our comparative static results show that under reasonable condition trade reforms may lower aggregate unemployment in both cases where job destruction is exogenous as well as endogenous. On the other hand, labour market reforms may lead to ambiguous effects or does not have any effect on aggregate unemployment when job-destruction is inversely related to work's efficiency. This is quite interesting and hardly found in the standard literature on trade and unemployment.

Keywords: efficiency-wage, job-matching, general equilibrium

1. Introduction

In less developed countries though we find a large pool of low-skill labour, there also exists high-skill labour, especially in the service sector which has been growing after globalization. Thus, both high-skill as well as low-skill labour co-exists in many less developed economies like India. This skill differences also causes wage-gap in these countries.

The most striking feature of the high-skill labour market is the job-search and job-match. In this labour market labourers search better jobs and at the same time firms also search better workers. Production starts only when they are matched with each other. Job-searching is a costly and time-consuming process. Thus, when workers are matched with the firms, search costs are saved from both ends and this gives rise to match surplus which can be distributed between workers and firm through wage setting rule. The most widely used wage setting rule is the Nash-bargaining solution. This is the basic idea of the job-matching theory as developed by Diamond-Mortensen and Pissarides (DMP called hereafter, 2000). The DMP (2000)^[7] model is a one-sector job-matching model and this model explains the effects of different labour policies on equilibrium rate of frictional unemployment.

Other notable works on this front are Diamond (1982a, 1982b, 1984)^[15, 16], Pissarides (1979, 1984, 1985a, 1985b, 1986, 2000)^[35-44], Mortensen (1987, 2011)^[32, 33], Mortensen and Pissarides (1994, 1998, 1999)^[34, 35, 36] etc. All these models explain the existence of frictional unemployment where matching plays the central role to determine frictional unemployment.

The job-matching model has been extended by Albrecht *et al.* (1984)^[4], Cole and Rogerson (1989)^[11], Andolfatto (1996)^[6], Acemoglu and Shimer (1999)^[1], Shimer (2004, 2005)^[48, 49], Sheng and Xu (2007), Zenou (2008), Hall (1979), Balanchard and Diamond (1994)^[18], Smith and Zenou (2003), Steven (2002), Gariboldi and Moen (2010), Helpman and Redding (2009), Hagedorn *et al.* (2008), Fujita *et al.* (2009), Bosch *et al.* (2008), Bown and, Merkl and Snower (2009), Moscarini (2005), Shimer and Smith (2000)^[50], Zaharieva (2010)^[54], Dolado *et al.* (2009)^[17], etc. All these works either extend the DMP (2000)^[7] model or use the DMP (2000)^[7] framework to investigate the parametric effects on frictional unemployment.

The existence of frictional unemployment can be explained with the help of match friction and on the other hand normal unemployment can be explained in terms of efficiency wage theory. The earliest version of the efficiency wage theory is the 'Consumption efficiency hypothesis' of Leibenstein (1957, 1958)^[29, 30]. According to this hypothesis, efficiency of a worker depends positively on the level of his consumption. This is widely observed in less developed countries where level of consumption per worker is very low^[1]. Assuming consumption per worker is a stable function of wage income per worker then we can reasonably link worker's efficiency to the wage rate that he receives.

The intuition behind the efficiency wage theory is that an employer desires to pay a worker efficiency wage instead of profit maximizing wage because worker's efficiency can be maintained in production activity. In the efficiency wage model, a firm generally minimises unit labour cost and in equilibrium, efficiency wage is set where the elasticity of efficiency function with respect to wage is equal to unit. This is the standard Solow-elasticity condition^[2]. This implies that efficiency wage is constant. A firm will not pay lower wage to the worker even if there exists excess supply of labour at the efficiency wage. So, the labour market does not clear which leads to normal/ involuntary unemployment in the economy. This is the implication of the efficiency

¹ See Bose (1996)

² See Solow (1979).

wage theory to the labour market ^[3].

In this paper we integrate job-matching model of DMP (2000) ^[7] and efficiency wage model of Leibenstein (1957, 1958) ^[29, 30] in a simple two-sector general equilibrium set-up. We consider two types of unemployment normal and frictional. Normal unemployment is related to the low-skill labour where as frictional unemployment is associated to the high-skill labour. We also assume workers' efficiency depends positively on the wage rates in both sectors. However, non-frictional wage is determined exclusively by the efficiency wage theory but the frictional wage rate may be determined by the Nash-bargaining theory. Like DMP (2000) ^[7] model, we consider both cases where job destruction is exogenous as well as endogenous. We investigate the effects of trade reforms and labour market reforms ^[4] on sectoral as well as aggregate unemployment in a small open economy when job destruction is exogenous as well as endogenous. Our results show that in both of the two cases trade reforms may reduce total unemployment under reasonable condition. However, labour market reforms may give different results in two cases. Such reforms may lower total unemployment when job destruction is exogenous, but it may lead to either no effects or ambiguous effects on aggregate unemployment if job destruction is endogenous. Thus, our theoretical results may predict that trade reforms are superior to labour market reforms for a small open economy having both frictional as well as normal unemployment.

Our model differs from the existing works. Firstly, we extend the DMP (2000) ^[7] model in two-sector general equilibrium framework by adding efficiency wage theory; secondly, we consider both normal and frictional unemployment in the economy; thirdly, unlike DMP (2000) ^[7] we endogenise the job destruction rate by linking it to the worker's efficiency in the frictional sector ^[5] fourthly, we compare trade reform policy with the labour market reform policies in a efficiency induced match theoretic general equilibrium model.

2. The Model

We consider a small open economy consisting of two sectors: sector 1 and sector 2. Sector 1 is low-skill, non-frictional, informal sector which produces and exports commodity 1 ^[6]. The other sector 2 is high-skill, frictional and formal sector which is import-competing sector and produces Commodity 2. The prices of the two commodities are exogenous as the country is small. The price of commodity 1 is chosen as numeraire. The two sectors use both labour and capital in production. The production functions are of fixed-coefficient type ^[7]. Capital is perfectly mobile between the two sectors. So, we have a unique rate of return on capital. However, labour is assumed to be immobile factor due to the skill differences ^[8].

Both workers and the firms search each other only in sector 2 and workers are employed only when they are matched with the firms. In this sector there is match frictions and this leads to frictional unemployment of high-skill labour. But in sector 1, low-skilled workers are matched with the firms instantaneously. In this sector all workers do not get jobs but all vacancies are filled and so there is also unemployment of low-skill labour in this sector. This unemployment is non-frictional by nature and we may call it normal unemployment. Workers in sector 1 are paid efficiency wages and in the other sector 2 workers are unionized and the wage rate in this sector is determined by the Nash-bargaining solution. We assume job-destruction only in the frictional sector and it is exogenous.

Following DMP (2000) we consider the matching function as $m = m(u, v)$, where m stands for job-matching in the labour market, u is the frictional unemployment rate and v is the vacancy rate and $m_1, m_2 > 0, m_{11}, m_{22} < 0, m_{12} = m_{21} = 0$. Total flow

of matches $m = au$ and total flow of jobs is $m = vq$. The job arrival rate is $\frac{m}{u} = a$ and the job offer rate is $\frac{m}{v} = q$. Matching

function is assumed to possess CRS property and we may write $a = \frac{m}{u} = \frac{m}{v} \cdot \frac{v}{u} = \theta q(\theta)$ where $\theta = \frac{v}{u}$ is the labour market

tightness and $q'(\theta) < 0, \left| e_{q, \theta} \right| < 1$.

³ Note that the simple efficiency wage theory has been developed by Stiglitz and Shapiro (1984) where a worker's efficiency depends on both wage rate and unemployment rate. It has been further developed by 'Fair wage hypothesis by Agell and Lundborg (1992, 1995) where such efficiency depends on the functional distribution of income.

⁴ Here, we use a reduction in unemployment benefit and / a fall in the worker's bargaining power as index of labour market reforms and a fall in the price of the product produced in the frictional sector as an index of trade reforms. See Chaudhuri (2006) in this context.

⁵ We find a strong negative relation between wage rate and separation rate in the works of Leonard (1987), Anderson and Meyer (1994), Galizzi and Lang (1998) and Christensen et al. (2005), Capelli and Chauvin (1991). See also Zahaviera (2010).

⁶ Grinols (1991), Chandra and Khan (1993) and Gupta (1997) have assumed in their models that the products of the urban informal sector are export goods. This is also empirically justified in developing countries like India where many hand-made products are exported to the foreign countries.

⁷ In the DMP (2000) model it is assumed that capital is hired per unit of labour after when labour is matched with the firm. This implies fixed capital-labour ratio which in turn means complementarity between labour and capital.

⁸ It is assumed that low-skill workers can not perform high-skill jobs and high-skill workers do not opt for low-skill jobs even if they remain unemployed. This also implies that the underemployment of high-skill labour is assumed away in our model.

The general equilibrium structure of the model is as follows:

2.1 Non-frictional sector

It is assumed that the worker's efficiency h depends on the wage (W_1) they get. Thus, the simple efficiency-wage function for the frictionless sector is

$$h = h(W_1); h' > 0, h'' < 0 \tag{1}$$

Cost minimization with respect to wage rate gives the Solow elasticity condition as

$$e_{h, W_1} = 1 \tag{2}$$

The competitive equilibrium condition for the non-frictional sector is ^[9]

$$\frac{W_1}{h(W_1)} a_{L1} + r a_{K1} = P_1 = 1 \tag{3}$$

Where r is the rental on capital, P_1 is the price of commodity 1 which is taken as numeraire and $a_{j1} \forall j = L, K$ is the input coefficient in sector 1.

Fixed endowment equation of the low-skill labour force is

$$a_{L1} X_1 = h L_1 (1 - u_1) \tag{4}$$

X_1 is the level of output produced in sector 1, L_1 is the fixed endowment of the low-skill labour,

Where u_1 is the unemployment rate in sector 1,

2.2 Frictional Sector

The efficiency wage function for the frictional sector is

$$f = f(W_2); f' > 0, f'' < 0 \tag{5}$$

Where f is the worker's efficiency and W_2 is the wage rate in sector 2. The Nash-bargaining solution is ^[10]

$$\left(\frac{1 - e_{f, W_2}}{r + \lambda} \right) [\beta(J - V) - (1 - \beta)(W - U)] = 0$$

Where β is the worker's bargaining strength, λ is the job-destruction rate, J is the job capital, V is the vacancy, W is employment and U is unemployment in sector 2.

⁹ This can be derived from the job-creation condition in the frictionless sector.

¹⁰ See Appendix A.

For interior solution to exist $e_{f, W_2} \neq 1$ ^[11]. Thus the Solow-elasticity condition does not hold here which in turn implies that, in this case, the bargaining power of the worker is very strong so that the efficiency wage constraint can not affect the bargaining contract in the frictional sector. Thus, we get

Proposition 1: Frictional wage cannot be determined within the firm if job destruction rate is exogenous. The competitive equilibrium condition for the frictional sector is

$$\frac{W_2}{f(W_2)} a_{L2} + r a_{K2} + \frac{(r + \lambda)C}{q(\theta)} a_{L2} = P_2 \tag{6}$$

Where C is cost of vacancy, P_2 is the price of commodity 2, a_{j2} ($\forall j = L, K$) are the input coefficients in sector 2. Thus the Nash-wage equation is

$$\frac{W_2}{f(W_2)} = b + \xi(r + \lambda + \theta q(\theta)) \tag{7}$$

Here, b is the unemployment benefit^[12] and $\xi = \frac{\beta C}{(1-\beta)q(\theta)}$ is the frictional cost of labour in sector 2. The Beveridge curve is

$$u_2 = \frac{\lambda}{(\lambda + \theta q(\theta))} \tag{8}$$

Where u_2 is the equilibrium rate of frictional unemployment. The endowment equation for the high-skill workers in the frictional sector is

$$a_{L2} X_2 = f L_2 (1 - u_2) \tag{9}$$

Where X_2 the level of output produced in sector 2 is, L_2 is the endowment of high-skill labour in sector 2.

The capital endowment (K) equation for the economy as a whole is

$$a_{K1} X_1 + a_{K2} X_2 = K \tag{10}$$

Where a_{Ki} ($i = 1, 2$) are unit requirement of capital in the i th sector.

Thus, our system consists of ten equations and ten unknowns: $W_1, W_2, h, f, r, \theta, u_1, u_2, X_1, X_2$. Equation (2) determines W_1 and then we get equilibrium h from Equation (1). Equation (3) yields r . From (6) and (7) we get equilibrium values of W_2, θ , given P_2, r, C, b . Then f is obtained from (5) and u_2 is determined from (8), given λ . From (9) we get equilibrium value of X_2 . Then (10) gives X_1 , given K . Finally, u_1 is obtained from Equation (4).

¹¹ See Appendix B.

¹² For simplicity it is assumed that unemployment person in the formal sector only get unemployment benefit. We find this in India where researchers and scientists get honorarium from the government for their contribution in the subjects. However, the assumption of unemployment benefit in both sectors does not affect our basic results.

It is assumed that frictional wage rate is greater than the non-frictional wage rate which in turn implies that frictional labour market is more efficient than the frictionless one.

2.3 Comparative Static Effects

2.3.1 Change in P_2

Suppose P_2 is reduced. In this case, W_1, h, r do not change at all since these are independent of P_2 . The effects of changes in P_2 on W_2, θ can be obtained from Equations (6) and (7). Solving these two equations and after simplification one gets

$$\frac{\hat{W}_2}{\hat{P}_2} = -\frac{\xi}{\Delta} \left[(r + \lambda) \left| e_{q, \theta} \right| + \theta q(\theta) \right] > 0$$

(-) (+)

(11)

$$\frac{\hat{W}_2}{\hat{b}} = -\frac{\xi}{\Delta} b \left[\frac{(r + \lambda) C}{q(\theta)} \left| e_{q, \theta} \right| \frac{a_{L2}}{P_2} \right] > 0$$

(-) (+)

(12)

$$\frac{\hat{W}_2}{\hat{\beta}} = -\frac{\xi}{\Delta} (r + \lambda + \theta q(\theta)) e^{\xi} \left[\frac{(r + \lambda) C}{q(\theta)} \left| e_{q, \theta} \right| \frac{a_{L2}}{P_2} \right] > 0$$

(-) (+)

(13)

$$\frac{\hat{\theta}}{\hat{P}_2} = -\frac{W_2}{\Delta f} \left(1 - e_{f, W_2} \right) > 0$$

(-) (+)

(14)

$$\frac{\hat{\theta}}{\hat{b}} = \frac{W_2}{\Delta f} b \left(1 - e_{f, W_2} \right) \frac{a_{L2}}{P_2} < 0$$

(-) (+)

(15)

$$\frac{\hat{\theta}}{\hat{\beta}} = \frac{W_2}{\Delta f} \xi e^{\xi} (r + \lambda + \theta q(\theta)) \left(1 - e_{f, W_2} \right) \frac{a_{L2}}{P_2} < 0$$

(-) (+) (+) (+)

(16)

Thus, if P_2 is reduced both W_2, θ fall. From Equation (8) it is evident that u_2 rises when θ falls, given λ . On the other hand, f falls as W_2 falls. From Equation (9) we find that X_2 also falls as W_2 falls and u_2 rises, given L_2, a_{L2} . Now from (10) it is evident that X_1 rises when X_2 falls, given a_{K1}, a_{K2}, K . Then Equation (4) shows that u_1 must fall to restore labour market equilibrium in sector 1, given a_{L1}, h, L_1 . Thus, our results indicate that if P_2 falls u_2 rises and u_1 falls. This implies that given the sector specific labour force, frictional unemployment rises and normal unemployment falls. So far as the net effect is concerned we find that under the reasonable condition that labour share in efficiency adjusted term is greater than capital share in

the frictionless sector ($\lambda_{L1}^* > \lambda_{K1}$) aggregate unemployment must fall in our model ^[13].

On the other hand, if unemployment benefit and /worker's bargaining power in the frictional sector falls W_2 falls and θ rises.

Equation (8) shows that u_2 falls, given λ and f also falls as W_2 falls. From (9) we find that X_2 may or may not change ^[14]. If X_2 does not change X_1 also does not change (see Equation (10)). So, u_1 remains unchanged (see Equation (4)). In this case, aggregate unemployment falls along with frictional unemployment. If X_2 falls due to labour market reforms, X_1 rises to restore equilibrium in the capital market and this implies that u_1 also falls. Thus, total unemployment would fall more. However, if X_2 rises then X_1 falls and so u_1 rises. In this case, frictional unemployment falls but normal unemployment rises and the net effects on aggregate unemployment is ambiguous if $\lambda_{L1}^* > \lambda_{K1}$. Thus, we can make the following proposition:

Proposition2: In the presence of both efficiency wage and bargained wage when job separation rate is exogenous, trade reforms

lower aggregate unemployment in a small frictional open economy if $\lambda_{L1}^* > \lambda_{K1}$. On the other hand, labour market reforms reduce aggregate unemployment if the frictional sector does not expand and if frictional sector expands such reforms produce

ambiguous effects on aggregate unemployment under the condition $\lambda_{L1}^* > \lambda_{K1}$.

Note that if we assume constant efficiency in the frictional sector ^[15]. $\hat{f} = 0$. This implies that total employment rises less than what we get in the case of variable efficiency in the frictional sector. So, total unemployment falls but in smaller amount provided the efficiency adjusted labour share is more than capital share in sector 1. On the other hand, labour market reforms leads to the expansion of sector 2 if $f = 1$. This implies that X_1 falls and u_1 rises more. Here, u_2 falls. But total unemployment rises more if $\lambda_{L1}^* > \lambda_{K1}$. This means that if f is constant aggregate unemployment would be more volatile in the case of labour market reforms and less volatile in the case of trade reforms. Thus, the level of efficiency in the frictional sector plays significant role to influence aggregate unemployment (more precisely normal unemployment) in a small open economy characterized by frictional labour market.

3. An Extension of the Basic Model

Now, we relax the assumption that job-destruction is exogenous. Instead we assume that it is inversely related to the worker's

efficiency in the frictional sector; i.e. $\lambda = \lambda(f); \lambda' < 0$. Here, it is assumed that the match surplus is a function of both the productivity of the job and the job destruction rate such that a lower destruction rate gives rise to a higher match surplus. Higher match surplus implies higher wages given worker's bargaining power and this in turn implies higher efficiency of the worker ^[16]. So, a worker remains matched with a firm long time if his efficiency rises.

In the extended version of the first model the Nash-Bargaining solution is changed as

$$\frac{\left(1 - e_{f, W_2}\right)}{\left(r + \lambda(f)\right) f} \left[\beta(J - V)\left(1 - e_L\right) - (1 - \beta)(W - U)\left(1 - e_F\right) \right] = 0$$

¹³ See Appendix B.

¹⁴ In the efficiency wage model total output depends on the efficiency unit of labour.

¹⁵ As the worker in the frictional sector gets higher wage, he possess high level of efficiency which is less responsive to wage rate. Thus, we may assume this worker has already reached a higher level of efficiency which is invariant to wage rate.

¹⁶ See Zahaviera (2010).

Where $e_L = \frac{\partial \log(r + \lambda(f))}{\partial \log\left(\frac{W_2}{f} - rU_2\right)} < 1$ = elasticity of the extended discount rate w.r.t.net wage income.

$e_F = \frac{\partial \log(r + \lambda(f))}{\partial \log\left(P_2 - \frac{W_2}{f} - rk_2\right)} < 1$ = elasticity of the extended discount rate w.r.t. flow of profit.

In this case, Solow-elasticity condition may or may not hold ^[17]. Thus, we can make the following proposition:

Proposition 3: Frictional wage may or may not be determined within the firm depending on the relative bargaining strength of the labour union when job destruction rate is inversely related to the worker’s efficiency in the frictional sector.

Let us first assume that Solow elasticity condition holds. This implies that Equation (7) is replaced by

$$e_{f, W_2} = 1 \tag{7'}$$

Equation (7') shows that in the frictional sector wage rate is also determined by the efficiency-wage theory even though there is wage bargaining between firm and worker. This means that efficiency is more influential than bargaining to determine frictional wage rate.

The competitive equilibrium condition for the frictional sector is also changed as

$$\frac{W_2}{f(W_2)} a_{L2} + r a_{K2} + \frac{(r + \lambda(f))C}{q(\theta)} a_{L2} = P_2 \tag{6'}$$

The frictional unemployment rate boils down to

$$u_2 = \frac{\lambda(f)}{(\lambda(f) + \theta q(\theta))} \tag{8'}$$

All other equations remain unchanged in the extended model. Now, W_2 is determined from (7'). Then θ is determined from (6') and u_2 is obtained from (8').

3.1 Comparative Static Effects

The comparative static effects also gET ALtered in the extended model. In this model along with $W_1, h,$ and $r W_2$ does not change when P_2 is reduced through trade reforms if Solow elasticity condition holds. Equation (6') shows that if P_2 is reduced θ also falls, given W_2, a_{L2}, a_{K2}, r and C . From (8') it is clear that u_2 must rise when θ falls, given f . Equation (9) again shows that X_2 falls and (10) shows that X_1 rises which in turn implies that u_1 falls (see Equation (4)). Thus, in this extended version trade reforms also raises frictional unemployment and reduces normal unemployment. We find that aggregate unemployment reduces if $\lambda_{L1}^* > \lambda_{K1}$. However, labour market reforms via fall in unemployment benefit and/worker’s bargaining power in the frictional sector have no effects on sectoral as well as aggregate unemployment. These results make the

¹⁷ Frank (2012) shows that the efficiency wage and the bargained wage are independent. If worker’s bargaining power is weak efficiency wage equilibrium emerges. If worker’s bargaining power is strong we have a bargaining contract that is unaffected by the efficiency wage constraint.

following proposition:

Proposition4: Under the Solow elasticity condition and endogenous job destruction, trade reforms reduces total unemployment if $\lambda_{L1}^* > \lambda_{K1}$ and labour market reforms do not have any effects on sectoral as well as total unemployment.

Now let us assume that the Solow-elasticity condition does not hold ^[18]. In this case, the Nash-Bargaining solution implies

that $\left[\beta(J - V)(1 - e_L) - (1 - \beta)(W - U)(1 - e_F) \right] = 0$. This leads to the following Nash-wage equation:

$$\frac{W_2}{f(W_2)} = (1 - \beta)b + \beta(P_2 + C\theta - rk_2) \left(\frac{1 - e_L}{1 - e_F} \right);$$

i.e.
$$\frac{W_2}{f(W_2)} = \frac{(1 - \beta)}{(1 - \beta M)} b + \frac{(1 - \beta)}{(1 - \beta M)} M \xi(r + \lambda + \theta q(\theta))$$

$$\frac{W_2}{f(W_2)} = Tb + TM \xi(r + \lambda + \theta q(\theta)) \quad (7'')$$

Where $T = \frac{(1 - \beta)}{(1 - \beta M)}$ and $e_T, \beta < 0$

$$M = \frac{(1 - e_L)}{(1 - e_F)}$$

where

Note that if $e_L = e_F$ we get the Nash-wage rate like earlier version of the model where $e_f, W_2 = 1$. However, if $e_L \neq e_F; e_L < 1, e_F < 1$ then the extended discount rate adjusted firm's surplus and worker's surplus would be

$\left(\frac{J - V}{1 - e_F} \right), \left(\frac{W - U}{1 - e_L} \right)$ respectively. Here, the extended discount rate adjusted total match surplus is

$$S' = \left(\frac{J - V}{1 - e_F} \right) + \left(\frac{W - U}{1 - e_L} \right) \text{ and}$$

$$\left(\frac{J - V}{1 - e_F} \right) = (1 - \beta)S' \text{ and } \left(\frac{W - U}{1 - e_L} \right) = \beta S'$$

.So, the surplus sharing rule is

$$\beta \left(\frac{J - V}{1 - e_F} \right) = (1 - \beta) \left(\frac{W - U}{1 - e_L} \right)$$

Now, taking total differentials of (6') and (7'') and then solving by Cramer's rule we get

¹⁸ This implies that employer prefers industrial peace more to worker's efficiency in the frictional labour market. So, wage in the frictional market is determined by the bargaining theory, instead of the efficiency wage theory.

$$\frac{\hat{W}_2}{\hat{P}_2} > 0, \frac{\hat{W}_2}{\hat{b}} > 0, \frac{\hat{W}_2}{\hat{\beta}} < 0 \text{ (if } |e_T, \beta| > e^\xi_\beta) \text{ and}$$

$$\frac{\hat{\theta}}{\hat{P}_2} > 0, \frac{\hat{\theta}}{\hat{b}} < 0, \frac{\hat{\theta}}{\hat{\beta}} > 0 \text{ (if } |e_T, \beta| > e^\xi_\beta)$$
(17)

Taking total differentials of (8') and using (17) we get

$$\frac{\hat{u}_2}{\hat{P}_2} < 0; \frac{\hat{u}_2}{\hat{b}} > 0, =, < 0; \frac{\hat{u}_2}{\hat{\beta}} > 0, =, < 0$$
(18)

From (17) and (18) it is evident that if P_2 falls both W_2, θ fall and then f falls and u_2 rises. From (9) we find X_2 falls, given L_2, a_{L2} . Equation (10) shows that X_1 rises when X_2 falls, given a_{K1}, a_{K2}, K . This implies that u_1 must fall, given a_{L1}, h, L_1 (see Equation (4)). Now, total unemployment reduces if $\lambda_{L1}^* > \lambda_{K1}$. However, if b/β falls u_2 may move in any direction. Thus, its effects on u_1, U are ambiguous. These results lead to the following proposition:

Proposition 3: In the presence of both efficiency wage and bargained wage if job destruction is inversely related to the worker's efficiency in the frictional sector then trade reforms may reduce aggregate unemployment where as labour market reforms create ambiguous effects on total unemployment.

4. Conclusions

In small open economy frictional unemployment is not so much acute because this type of unemployment is basically related to the high-skill workers which are scarce in such economy. Usually normal unemployment is observed here. After globalization workers have also acquired skill in the small open economy. Thus, it is reasonable to think the co-existence of both normal as well as frictional unemployment in this economy.

In our model we find that if job-destruction rate is exogenous, frictional wage cannot be determined within the firm. Nash-bargaining game plays crucial role in this context. However, if job-destruction is inversely related to the worker's efficiency, frictional wage may or may not be determined within the firm depending on the relative bargaining strength of the worker.

The development economists are very much interested regarding the effects of economic reforms on small open economy. So far as the trade reforms are concerned the traditional argument is that trade reforms raises unemployment in the import-competing sector and reduces unemployment in the export sector. Thus, the net effect is ambiguous. However, our efficiency wage induced search theoretic model does not agree with this view. We consider different versions of our matching model. For instance, (i) when non-frictional wage is determined by the efficiency of the worker, frictional wage is determined by the workers bargaining power and job-destruction is exogenous; (ii) Both wage rates are determined by the worker's efficiency and job-destruction is inversely associated with worker's efficiency; and (iii) Wage rates are determined like the first version of the model but job-destruction is endogenous. In all the three cases we find that trade reforms may reduce total unemployment if labour share in efficiency adjusted term exceeds capital share in the frictionless sector.

However, in the case of labour market reforms we do not get uniform results. If unemployment benefit and/ worker's bargaining power falls aggregate unemployment may fall when job-destruction is exogenous and low-skill wage is determined by worker's efficiency and high-skill wage is determined by worker's bargaining power. If both wage rates are related to the worker's efficiency and job-destruction is related to the worker's efficiency then a reduction in unemployment benefit and / worker's bargaining power does not have any effect on sectoral as well as total unemployment. On the other hand if wage rate in the frictionless sector is determined by worker; efficiency and frictional wage is determined by worker' bargains power and job-destruction is endogenous then such policies produces ambiguous effects both on sectoral as well as total unemployment.

5. References

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