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Abstract

This paper builds a general equilibrium model for a small open economy with unemployment of unskilled labor to assess the impact of a recessionary shock. It is shown that irrespective of the factor intensity assumption skilled wage and rental ratio goes up if recession led price fall is significant. However, when the price fall is not sufficiently big, factor intensity assumption becomes crucial for the eventual effect on factors' return ration.

Key words: International Trade, General Equilibrium.

JEL classification: F11, D5

1. INTRODUCTION

In a very few recent papers the attempt has been made to look at the effects of recession on informal wage, informal output, skilled-unskilled wage gap, formal output etc. Notable among those are Marjit et al (2011), Chaudhuri (2010), Mandal et al (2010). All these papers have used a full employment framework where unionized formal sector leads to the emergence of informal units that absorb the left out unskilled workers. Unlike these works we frame a trade theoretic general equilibrium set up to accommodate the possibility of unemployment of unskilled workers. Absence of informal units helps bringing in unemployment issue in such a structure.

The prime focus of the current paper is to take a look at the recessionary shock on skilled wage and rental in general and skilled wage-rental ration in particular. Albeit being institutionally fixed, unskilled wage has a significant role in determining skilled wage-rental ratio in the post-recession phase[1]. The main result that we derive in this paper is that irrespective of factor intensity assumption recession is likely to raise the skilled wage-rental ratio. However, under a reasonable condition the ratio may decrease in post-recession situation.

The paper is structured as follows. Next section describes the model and derives basic results. Third section concludes the paper.

2. THE MODEL AND BASIC RESULTS

Taking clue from Batra and Beladi (1988, 1989) we develop a general equilibrium trade model in line of Jones (1965, 1971). We have a small open economy producing two goods X and

1. This is the main driving factor behind the solution of the model.

Y using three factors of production viz., skilled labor (S), unskilled labor (L) and capital (K). $\bar{w}$ is the institutionally determined wage rate for those unskilled workers who get employment. All unskilled workers are not fortunate enough to get job at the wage rate $\bar{w}$. so the rest remain unemployed. This is how we characterize underemployment in this model. S and K face competitive factor market and earn w_s and r as return, respectively. Goods' markets are competitive and production functions are linearly homogeneous. Moreover, S and K are fully employed. Thus we have following set equations to describe the model.

Competitive price equations ensures equality between cost of production and commodity prices.

$$w_s\, a_{sx} + \bar{w}\, a_{lx} + r\, a_{kx} = P_x \quad (1)$$

$$\bar{w}\, a_{ly} + r\, a_{ky} = P_y \quad (2)$$

On the other hand, competitive conditions that factors S and K be fully employed are:

$$a_{sx}.X = \bar{S} \quad (3)$$

$$a_{kx}.X + a_{ky}.Y = \bar{K} \quad (4)$$

Unemployment of L is described as

$$a_{lx}.X + a_{ly}.Y < \bar{L} \quad (5)$$

Input-output coefficients for X and Y are denoted by

$$a_{ix} = a_{ix}(w_s, \bar{w}, r) \quad (6)$$

$$a_{iy} = a_{iy}(\bar{w}, r) \quad (7)$$

Note that here $P_j \Rightarrow$ price of the jth commodity (j= X, Y); $w_s \Rightarrow$ skilled wage; $\bar{w} \Rightarrow$ unskilled pre-determined wage; $r \Rightarrow$ rate of return to K; $a_{ij} \Rightarrow$ production requirement of the ith factor in

one unit of j[th] commodity *(i = S,L,K* and *j = X,Y)*; $\bar{S} \Rightarrow$ total supply of skilled labor; $\bar{K} \Rightarrow$ total supply of capital; and $\bar{L} \Rightarrow$ total supply of unskilled labor.

Here we have nine unknown variables (X, Y, w_s, r, a_{sx}, a_{lx}, a_{kx}, a_{ly}, a_{ky}) and nine equations (equations (1), (2), (3), (4), (6) and (7)). Note that equation (6) – (7) contains five different equations for input coefficients. Equation (5) becomes redundant as X and Y can be solved from (3) and (4). Hence our model is complete and solved.

2.A Recessionary shock and factor return

During the last financial crisis led recession all the economies world wide have suffered. UNCTAD data (UNCTAD Report, 2009) shows that the global crisis has affected not only the manufacturing good but also the other goods. In between 2008-09, food prices have gone down by 30%, the price of agricultural raw material has experienced a fall of around 36%, it is 48% for vegetable oilseeds and oils, tropical beverages has been hit by 15% slash in price. These points are the trigger points of our comparative study. So we start from an observed phenomenon where P_x and P_y have decreased. Then we figure the possible theoretical consequences on factor prices. Without losing the essence of our analysis we presume that both P_x and P_y have fallen by the same extent. This would help us pin-point the focal issue of the paper.

As $\bar{w}$ is exogenous in the system it is not interesting to compare $\bar{w}$ with w_s and r. instead we emphasize on $\left({}^{w_s}/_{r}\right)$ or $(\hat{w}_s - \hat{r})$ [where $'\Lambda'$ represents proportional change].

Totally differentiating the price equations and rearranging yields

$$\hat{w}_s\,\theta_{sx} + \hat{\bar{w}}\theta_{lx} + \hat{r}\theta_{kx} = \hat{P}_x \qquad (8)$$

$$\hat{\bar{w}}\,\theta_{ly} + \hat{r}\theta_{ky} = \hat{P}_y \qquad (9)$$

θ_{ij} implies the value share of ith factor in jth commodity.

Solving for $\hat{r}$ and $\widehat{w}_s$ we get

$$\hat{r} = \frac{\hat{P}_y}{\theta_{ky}} - \frac{\widehat{\bar{w}}\,\theta_{ly}}{\theta_{ky}} \tag{10}$$

$$\widehat{w}_s = \frac{1}{\theta_{sx}\,\theta_{ky}}\left\{\left(\hat{P}_x\,\theta_{ky} - \hat{P}_y\theta_{kx}\right) + \widehat{\bar{w}}\left(\theta_{ly}\theta_{kx} - \theta_{lx}\theta_{ky}\right)\right\}$$

Note that $(\theta_{sx} + \theta_{lx} + \theta_{kx}) = 1 = (\theta_{ly} + \theta_{ky})$. Using this condition we have

$$\widehat{w}_s = \frac{1}{\theta_{sx}\,\theta_{ky}}\left\{\left(\hat{P}_x\,\theta_{ky} - \hat{P}_y\theta_{kx}\right) + \widehat{\bar{w}}\left(\left(\theta_{ly} - \theta_{lx}\right) - \theta_{sx}\theta_{ly}\right)\right\} \tag{11}$$

From (10) and (11)

$$(\widehat{w}_s - \hat{r}) = \frac{\hat{P}}{\theta_{sx}\,\theta_{ky}}\left(\theta_{ky} - \theta_{lx} - 1\right) + \frac{\widehat{\bar{w}}}{\theta_{sx}\,\theta_{ky}}\left(\theta_{ly} - \theta_{lx}\right) \tag{12}$$

As we have stated earlier, for sake of simplicity we assume, $\hat{P}_x = \hat{P}_y = \hat{P}$.

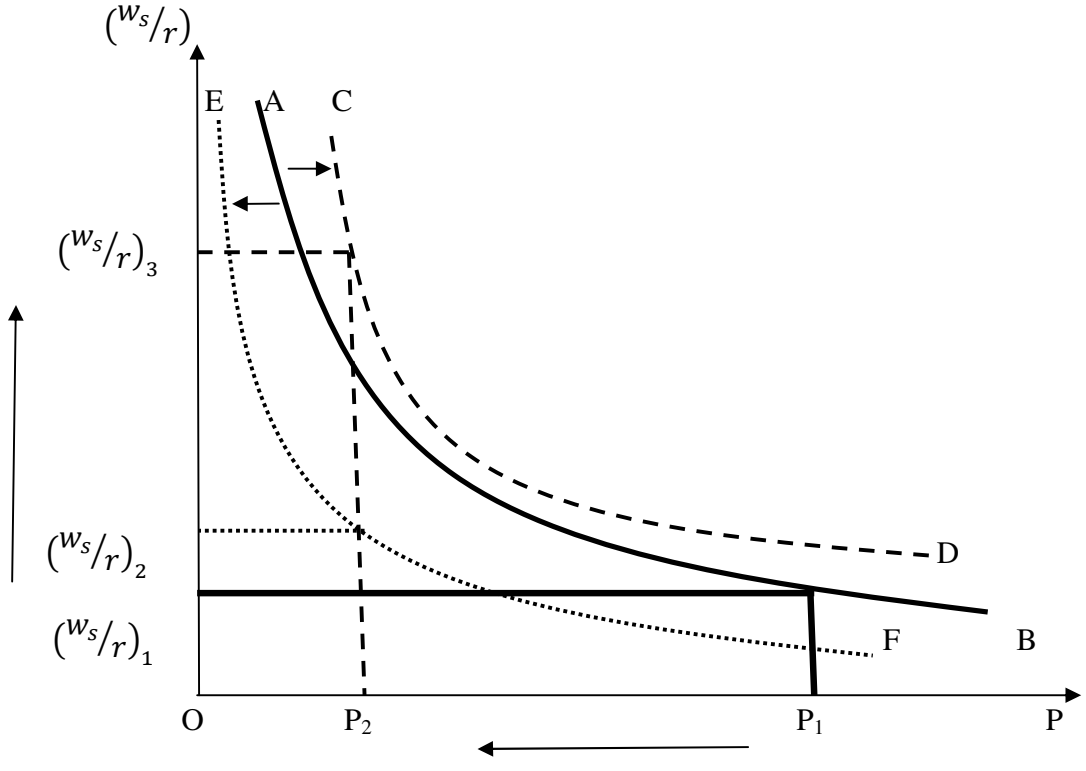

Figure-1

Whatever be the value of θ_{ky} and θ_{lx}, $(\theta_{ky} - \theta_{lx} - 1) < 0$ as $0 < \theta_{ky}, \theta_{lx} < 1$. Therefore it is apparent from (12) that given $\bar{w}$, P and $\left(w_s/r\right)$ are negatively related, whereas for any given P, a rise in $\bar{w}$ will cause an increase in$\left(w_s/r\right)$ if $\theta_{ly} > \theta_{lx}$ and conversely if $\theta_{ly} < \theta_{lx}$. These arguments are diagrammatically represented in figure-1.

For given $\bar{w}$ or for $\theta_{ly} = \theta_{lx}$, the relation between P and $\left(w_s/r\right)$ is given by AB line in figure-1. If $\theta_{ly} > \theta_{lx}$, AB will shift up to CD and when $\theta_{ly} < \theta_{lx}$, AB shifts down to EF.

Now we shall consider two situations simultaneously: a fall in general price level or P and an increase in institutionally determined $\bar{w}$. Say in the pre-recession phase the price level was at P_1 and the corresponding $\left(w_s/r\right)$ was $\left(w_s/r\right)_1$. Let us assume that in the post recession phase P has been reduced to P_2 and $\bar{w}$ has been raised to some extent in tandem. Depending on the value share of labor in Y and X AB will shift up or down. It is shown in figure -1 that if P falls substantially, it does not matter whether $\theta_{ly} \lesseqgtr \theta_{lx}$, $\left(w_s/r\right)$ must go up. In other words the difference between skilled wage and rental must expand. This leads to Proposition-I.

Proposition I: *Due to recessionary shock the gap between skilled wage and rental would be widened unambiguously if the extent of shock is relatively strong.* *QED*

Here it is important to note that for any given $\bar{w}$, a fall in P must increase (sliding up through AB) $\left(w_s/r\right)$ ratio. Factor intensity assumption is redundant in this case.

However, if P does not fall significantly we may have an interesting result. If Y happens to be more labor intensive in value sense than X, $\left(w_s/r\right)$ would rise up to $\left(w_s/r\right)_3$ consequent upon a fall in P from P_1 to P_2. Whereas if Y becomes less labor intensive than X, $\left(w_s/r\right)$ would fall instead. This is shown in figure-2. Therefore the following Proposition is immediate.

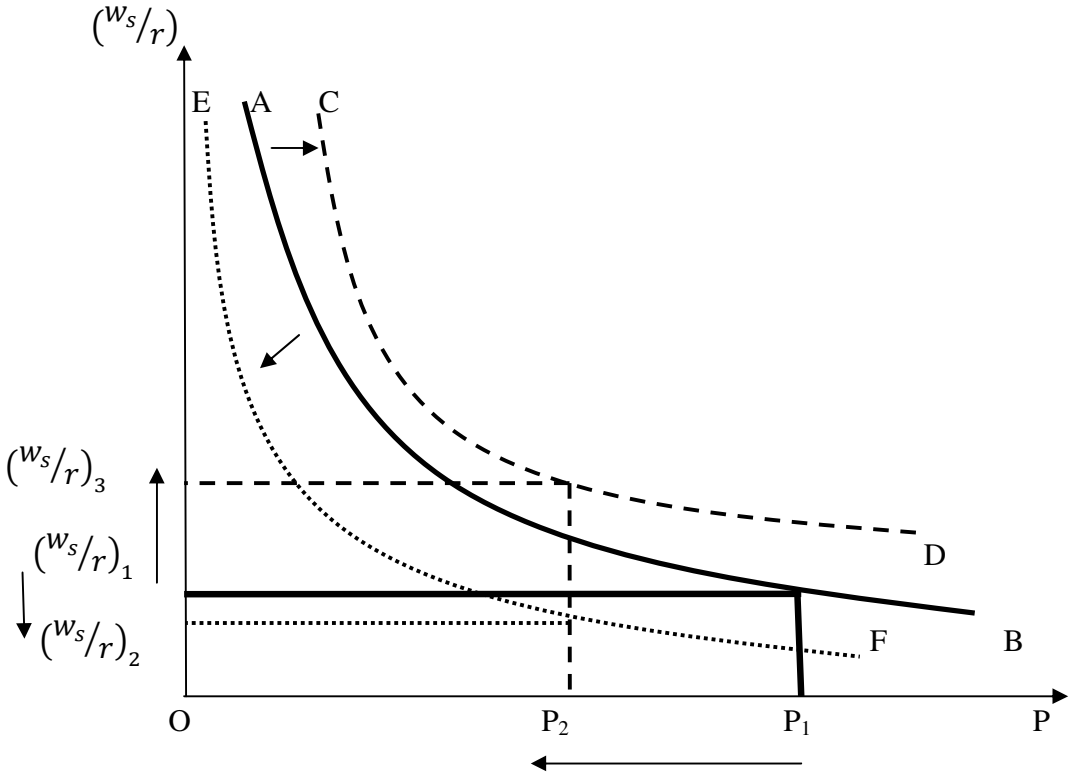

Figure-2

Proposition II: *If the recessionary shock is not so strong the skilled wage and rental ratio would rise if* $\theta_{ly} > \theta_{lx}$ *and would fall if* $\theta_{ly} < \theta_{lx}$. *QED*

3. CONCLUSION

In this paper we have developed a general equilibrium model of trade for small open economy with unemployment. It is proved that a recessionary would enhance the skilled wage and rental ratio. If institutionally determined unskilled wage rate goes up in tandem with recessionary shock, the skilled wage and rental ratio would increase if the value share of labor in Y is greater than X. Interestingly the ration would decrease if X becomes more labor intensive compared to Y.

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