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A Comment on "Increasing Returns and Spatial Unemployment Disparities"*

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Abstract

By introducing the efficiency wage hypothesis into a simple "new economic geography" model, Suedekum (2005) argued that lower (higher) unemployment rates and higher (lower) real wages hold in the higher (lower) population region when workers are immobile across regions and that the workers' free mobility increases such regional disparities. We show, however, that his argument about the stability of equilibria is questionable and under the valid stability analysis his result no longer holds.

JEL Classification: F4, J6, R1

Keyword: Regional unemployment, economic geography, increasing returns, wage curve, migration, labour mobility

1. Introduction

Blanchflower and Oswald (1996) empirically demonstrated that in many countries regional wages are negatively related to regional unemployment rates in the long run and they called the relationship "the wage curve". After their study, many researchers have offered various models which can explain such a phenomenon, and Suedekum (2005) is one of such attempts. Constructing an analytically solvable general equilibrium model in which real wages are determined through the efficiency wage hypothesis and differentiated intermediate goods are produced under the IRS (increasing return to

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scale) technology, he argued that in the short run (namely, when workers are immobile across regions) lower (higher) unemployment rates and higher (lower) real wages hold in the higher (lower) population region, and that in the long run (namely, when workers are mobile across regions) such regional disparities diverge. In this note we reexamine his argument and show it is not correct.

Suedekum (2005) showed that in the short run there are two equilibria (one is characterized with high real wage and low unemployment rate and the other is characterized oppositely) and claimed that the stable equilibrium is the former. However, he pointed out it by the intuitive explanation only, and omitted the rigorous stability analysis. By reexamining the stability of equilibria, we show that the stable equilibrium is the former), and that the opposite of Suedekum (2005)'s result holds in the latter equilibrium; namely, in the short run lower (higher) unemployment rates and higher (lower) real wages hold in the *lower (higher)* population region and in the long run such regional disparities *converge*. This result means that Suedekum (2005) did not succeed in explaining the wage curve phenomenon theoretically.

2. Reexamination and its result

Suedekum (2005)'s model is comprised of the following two equations concerning the relationship between the real wage (w_r) and the unemployment rate (U_r) in the region r:

(1)
$$[V_{es,r} = V_{en,r}]$$
 $w_r = e + b + t + \frac{\gamma e}{(1 - \gamma)(1 - \delta_r)}$, $(\delta_r = (R/U_r) - R)$

(2)
$$[N_r l_r = (1 - U_r) L_r]$$
 $w_r = (L_r / B)^{(1-\theta)/\theta} (1 - U_r)^{(1-\theta)/\theta}$, $(B : a \text{ constatnt})$

where the notation is basically the same as the original paper. The equation (1) represents the efficiency wage as a function of a given unemployment rate, which is derived by equalizing the value of non- shirking workers $(V_{en,r})$ to that of shirking

workers $(V_{es,r})$. This relationship is called the VV schedule. The equation (2) represents

the relationship between w_r and U_r that clears the labor market, which is derived by equalizing the labor demand $(N_r l_r)$ to the labor supply $((1-U_r)L_r)$. This relationship is called the BB schedule. From (1) and (2) we can calculate the equilibrium pair of w_r and U_r in the short run in which workers are immobile across regions. When $\theta > 1/2$ holds, these equations can be depicted as Figure 1, and the two equilibria $(E_1 \text{ and } E_2)$ can exist as Suedekum (2005) showed. He claimed that in two equilibria the stable one is E_1 , but he pointed out it by the intuitive explanation only and omitted the rigorous stability analysis. Concerning the adjustment process around the BB schedule he stated below:

For all points below the BB-schedule, wages are too low for any given unemployment rate. Producers in the Y-sector (the final goods sector) makes positive profits that induces others to enter the market. This expansion of the Y-sector translates into rising prices for intermediate products, which subsequently must be absorbed by higher wages for the manufacturing workers in the X-sector (the intermediate goods sector). (p173)

(Figure 1 around here)

Is this statement correct? If it is the real wages (not the unemployment rate) that is adjusted when the economy is not on the BB schedule, such an adjustment process must be formulated as

(3)
$$\Delta w_r / w_r = \phi_1 [N_r l - (1 - U_r) L_r] \\ = \phi_1 [B w_r^{\theta/(1-\theta)} - (1 - U_r) L_r],$$

where $\phi_1(>0)$ is an exogenous parameter about the adjustment speed of the real wage. The equation (3) shows that the real wage increases when the excess demand is positive $(N_r l > (1-U_r)L_r)$. We can easily confirm that under (3) the excess demand is negative and the real wage *drops* (the direction of the phase arrow is *downward*) in all points below the BB schedule. This contradicts Suedekum's claim quoted above. This means that even if we accept his claim that it is the real wage (not the unemployment rate) that clears the labor market, the correct direction of the phase arrow is opposite of his claim and therefore E_1 is no longer the stable equilibrium.

However, the more fundamental problem is that his claim itself is questionable, for in his model the real wage is determined not by the labor market clearing condition but by the efficiency wage hypothesis. In his model firms pull up the real wage to draw workers' effort when $V_{es,r} > V_{en,r}$ holds, which means that the real wage is adjusted when the economy is not on the VV (not BB) schedule. Considering this, the valid adjustment process of the real wage must be formulated as

(4)
$$\Delta w_r / w_r = \Psi_1 [V_{es,r} - V_{en,r}]$$

$$=\psi_1(1-\gamma)(1-\delta_r)\left[e+b+t+\frac{\gamma e}{(1-\gamma)(1-\delta_r)}-w_r\right],$$

where $\psi_1(>0)$ is the an exogenous parameter. Given (4), $V_{es,r} > V_{en,r}$ holds and the real

wage increases for all points below the VV schedule.

Since the real wage is determined to satisfy (1) (the VV schedule), it is the unemployment rate that clears the labor market (namely, that satisfies (2)). So the adjustment equation of the unemployment rate can be formulated as

(5)
$$\Delta U_r / U_r = \psi_2 [(1 - U_r)L_r - N_r l] = \psi_2 [(1 - U_r)L_r - Bw_r^{\theta/(1-\theta)}]$$

where Ψ_2 (> 0) is an exogenous parameter. The equation (5) means that the unemployment rate increases when the labor supply (= $(1-U_r)L_r$) exceeds the labor demand (= $N_r l$). Graphically, the direction of the phase arrow is rightward below the BB schedule as depicted in Figure 2. Accordingly, we can conclude that in two equilibria (E_1 and E_2) the stable equilibrium is E_2 .

(Figure 2 around here)

We can also derive this conclusion by interpreting both VV and BB schedules as "the reaction functions". See Figure 3 for this point. When the initial unemployment rate is given by U_r^1 , then the real wage set by firms according to the efficiency wage rule is w_r^1 on the VV schedule. And when the real wage is given by w_r^1 , the new unemployment rate which clears the labor market is U_r^2 on the BB schedule. By iterating this induction, we can easily see that the economy approaches to E_2 .

(Figure 3 around here)

As is depicted in Figure 4, at the stable equilibrium E_2 lower (higher) unemployment rate and higher (lower) real wage hold in the *lower (higher)* population region in the short run. This result is opposite of Suedekum (2005)'s one. Furthermore, since workers move from the higher population region with lower real wage to the lower population region with higher real wage in the long run with free mobility, the regional disparities decreases and finally the real wages are equalized between two regions. This is also different from Suedekum's result that regional disparities diverge by free labor migration. Our result, therefore shows that Suedekum (2005)'s model does not succeed in explaining the wage curve phenomenon.

(Figure 4 around here)

Reference

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(Figure 1)



(Figure 2)





(Figure 4)