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, labor mobility

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1. Introduction

Blanchflower et al. (1996) empirically demonstrated that in many countries, regional wages are negatively related to regional unemployment rates in the long run and they called this relation “the wage curve.” After their study, many researchers have offered various theoretical models that can explain such a phenomenon, and the study by Suedekum (2005) is one such attempt. 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 increasing return to 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 paper, we reexamine his argument and show that it is incorrect.

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 with low real wage and high unemployment) and claimed that the stable equilibrium is the former. However, he omitted the detailed stability analysis and pointed it out by the intuitive explanation only. By reexamining the stability of equilibria, we demonstrate that the opposite result holds, namely the stable equilibrium is the latter equilibrium (characterized with low real wage and high unemployment). This result means that 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, indicating that Suedekum (2005) does not succeed in theoretically explaining the wage curve phenomenon.
2. Reexamination and its results

Suedekum’s (2005) model comprises the following two equations concerning the relation between the real wage \(w_r\) and the unemployment rate \(U_r\) in region \(r\):

\[
\begin{align*}
\left[ V_{es,r} = V_{en,r} \right] \quad w_r &= c + b + t + \frac{\gamma e}{(1 - \gamma)(1 - \delta_r)} \quad \left( \delta_r = \frac{R}{U_r} - R \right) \\
N_r L_r &= (1 - U_r) L_r \quad w_r = \left( \frac{L_r}{B} \right)^{1-\theta} \left( 1 - U_r \right)^{1-\theta} \quad (B: \text{a constant})
\end{align*}
\]

where the notations are basically the same as Suedekum’s (2005) one. 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 relation is called the VV schedule. Equation (2) represents the relation between \(w_r\) and \(U_r\) that equalizes the labor demand \((N_r L_r)\) to the labor supply \(((1 - U_r)L_r)\); this relation 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 \((E_1\) and \(E_2)\) can exist, as reported by Suedekum (2005). He claimed that in two equilibria, the stable one is \(E_1\), but he omitted the detailed stability analysis, and pointed it out by the intuitive explanation only. With regard to the adjustment process around the BB schedule, he stated the following:

*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) make positive profits that induce 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)

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

\[
\frac{\Delta w_r}{w_r} = \phi_1 [N_r L_r - (1 - U_r) L_r] = \phi_1 \left[ BW_r^{\frac{\theta}{1-\theta}} - (1 - U_r) L_r \right],
\]

where \( \phi_1 > 0 \) is an exogenous parameter about the adjustment speed of the real wage. Equation (3) shows that the real wage increases when the excess labor demand is positive \((N_r L_r - (1 - U_r) L_r > 0)\). We can easily confirm that under (3), the excess labor 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 explanation quoted above, indicating that the correct direction of the phase arrow is opposite to his result even if we accept his claim that the real wage (and not the unemployment rate) clears the labor
market, and therefore, $E_1$ is no longer the stable equilibrium.

However, the more fundamental problem is that his claim itself is questionable because in his model, the real wage is determined not through equalizing $N_r L_r$ to $(1 - U_r)L_r$ but through equalizing $V_{es, y}$ to $V_{en, y}$. In his model, firms increase the real wage to draw workers’ effort when $V_{es, y} > V_{en, y}$ holds, which means that the real wage is adjusted when the economy is not on the VV schedule. Considering this, the valid adjustment process of the real wage must be formulated as follows:

$$
\frac{\Delta w_r}{w_r} = \psi_1 [V_{es, y} - V_{en, y}] = \psi_1 (1 - \gamma) (1 - \delta_r) \left[ e + b + t + \frac{ye}{(1 - \gamma)(1 - \delta_r)} - w_r \right],
$$

where $\psi_1 > 0$ is an exogenous parameter. Given (4), $V_{es, y} > V_{en, y}$ holds, and the real wage increases in all points below the VV schedule.

Since the real wage is determined to satisfy (1) (the VV schedule), it must be the unemployment rate that equalizes the labor demand to the labor supply. Therefore, the adjustment equation of the unemployment rate can be formulated as follows:

$$
\frac{\Delta U_r}{U_r} = \psi_2 \left[ (1 - U_r) L_r - N_r L_r \right] = \psi_2 \left[ (1 - U_r) L_r - Bw_r^{\gamma - \theta} \right],
$$

where $\psi_2 > 0$ is an exogenous parameter. Equation (5) shows that the unemployment rate increases when the labor supply $(= (1 - U_r)L_r)$ exceeds the labor demand $(=N_r L_r)$.

Graphically, the direction of the phase arrow is rightward below the BB schedule, as depicted in Figure 2. Accordingly, we can conclude that among two equilibria ($E_1$ and $E_2$), the stable equilibrium is $E_2$.

We can also derive this conclusion more easily by interpreting both VV and BB schedules as “reaction functions” (refer to Figure 3). When the initial unemployment rate is given by $U_{r}^{1}$, the real wage set by firms according to the efficiency wage rule is $w_{r}^{1}$ on the VV schedule. Further, when the real wage is given by $w_{r}^{1}$, the new unemployment
rate that clears the labor market is $u_r^2$ on the BB schedule. By iterating this induction, we can easily see that the economy converges to $E_2$.
As 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 to that of Suedekum's (2005) study. Furthermore, as 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 decrease and, finally, the real wages are equalized between the two regions. This is also different from the result obtained by Suedekum, according to which, regional disparities diverge by free labor migration. Our result, therefore, shows that his model does not succeed in explaining the wage curve phenomenon.
Reference
