Quantitative Macroeconomics - PS VI

Tommaso Bighelli

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1 Initial values and exogenous process

The Household problem is :

$$v(k,\epsilon;\Gamma,z) = max_{c,k'}(\frac{c^{1-\sigma}-1}{1-\sigma} + \beta E[v(k',\epsilon';\Gamma',z') \mid z,\epsilon]) \tag{1}$$

And the equilibrium factor prices are:

$$w(\bar{k},\bar{l},z) = (1-\alpha)z(\frac{\bar{k}}{\bar{l}})^{\alpha} \tag{2}$$

$$r(\bar{k},\bar{l},z) = \alpha z(\frac{\bar{k}}{\bar{l}})^{\alpha-1} \tag{3}$$

Plugging the equilibrium factor prices into the Household value function we obtain the guess:

$$v(k,1;\bar{k},z_g) = u(\alpha z_g k(\frac{\bar{k}}{(1-u_g)})^{\alpha-1} + (1-\alpha)z_g l(\frac{\bar{k}}{(1-u_g)})^{\alpha} - \delta k)/(1-\delta) \tag{4}$$

$$v(k,0;\bar{k},z_g) = u(\alpha z_g k(\frac{k}{1-u_g})^{\alpha-1} - \delta k)/(1-\delta) \tag{5}$$

$$v(k,1;\bar{k},z_b) = u(\alpha z_b k(\frac{\bar{k}}{(1-u_b)})^{\alpha-1} + (1-\alpha)z_b l(\frac{\bar{k}}{(1-u_b)})^{\alpha} - \delta k)/(1-\delta) \tag{6}$$

$$v(k,0;\bar{k},z_b) = u(\alpha z_b k(\frac{k}{1-u_b})^{\alpha-1} - \delta k)/(1-\delta) \tag{7}$$

The transition probabilities are:

- $\pi_{gg00} = \frac{7}{8}$
- $\pi_{gg10} = \frac{7}{8}$

- $\pi_{bg00} = \frac{7}{8}$
- $\pi_{bg10} = \frac{7}{8}$
- $\pi_{gg01} = \frac{1}{8}$
- $\pi_{gg11} = \frac{1}{8}$
- $\pi_{bg11} = \frac{1}{8}$
- $\pi_{gb00} = \frac{1}{8}$
- $\pi_{gb10} = \frac{1.5-1}{1.5} = \frac{7}{24}$
- $\pi_{bb00} = \frac{2.5-1}{2.5} = \frac{21}{40}$
- $\pi_{bb10} = 0$
- $\pi_{gb01} = 0$
- $\pi_{gb11} = 0.02$
- $\pi_{bb01} = 0.005$
- $\pi_{gb11} = 0.05$
- $\pi_{bb11} = 0.02$

2 Workers Problem and simulation

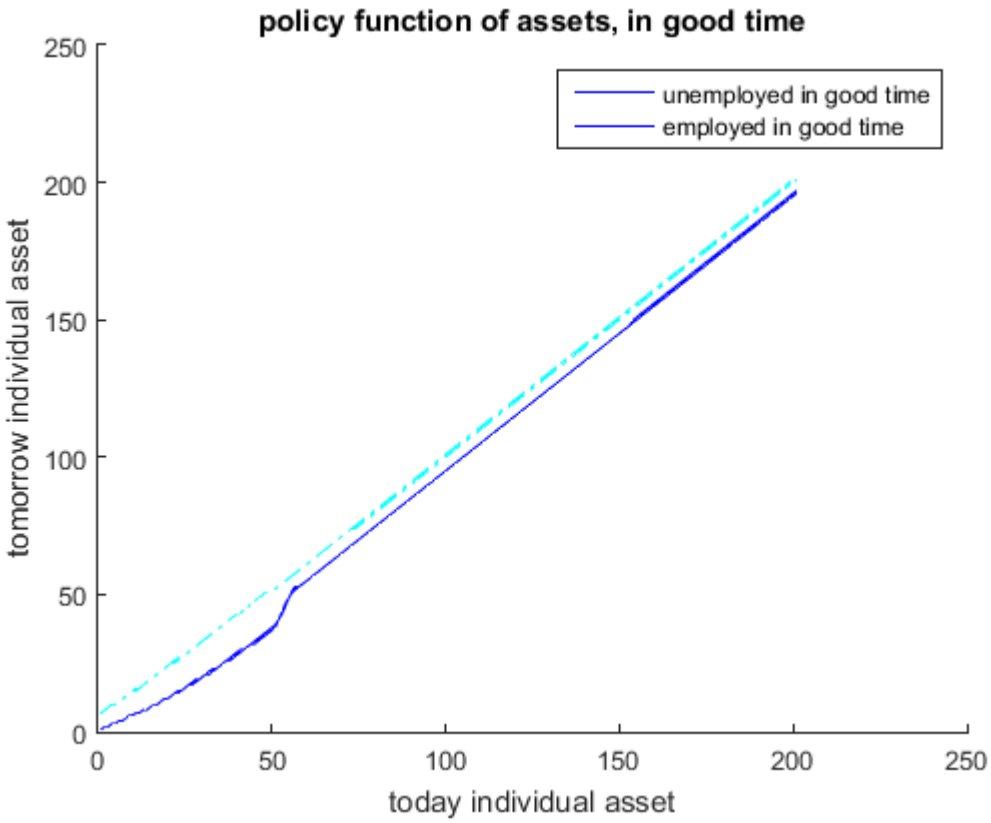

Figure 1: Policy function of asset in good time: the marginal propensities to consume are different for those agents with lower level of initial assets, marginal propensities to consume become more similar with higher level of assets.

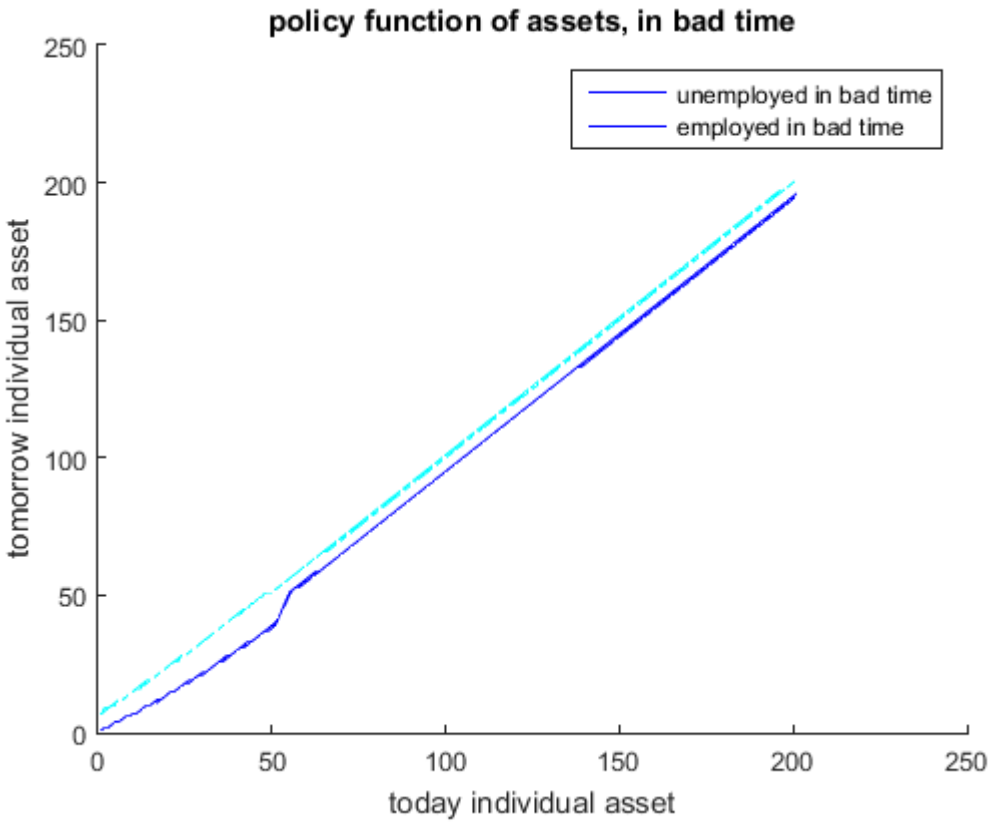

Figure 2: Policy function of asset in bad time: as we can observe the results are pretty much similar to those obtained in good time.

2.1 Simulation

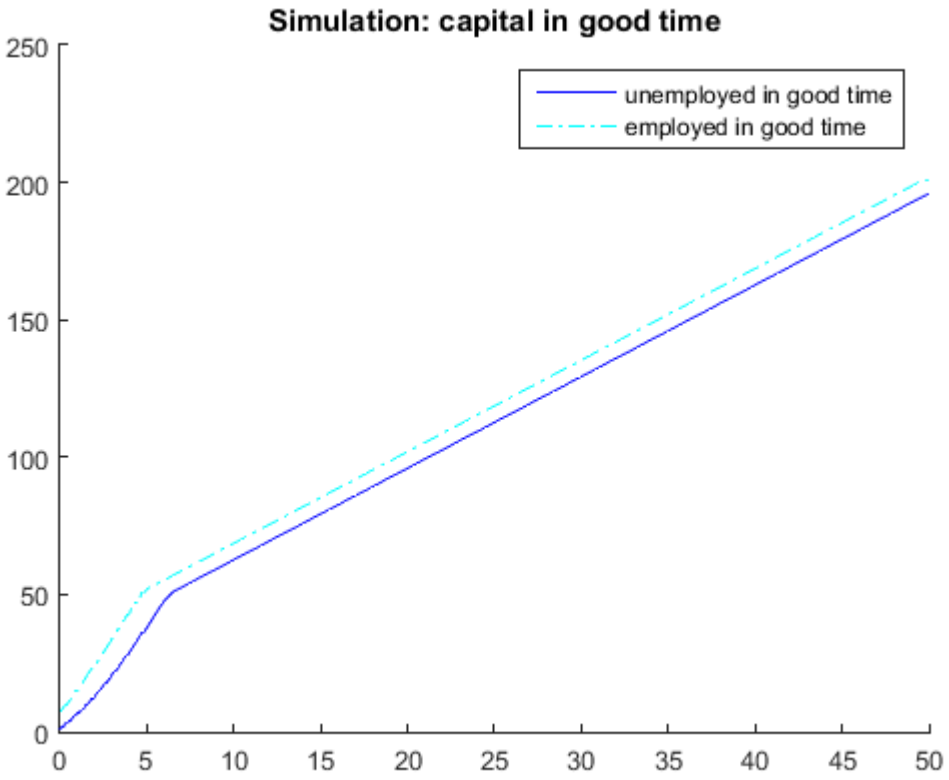

Figure 3: Simulation: capital in good time

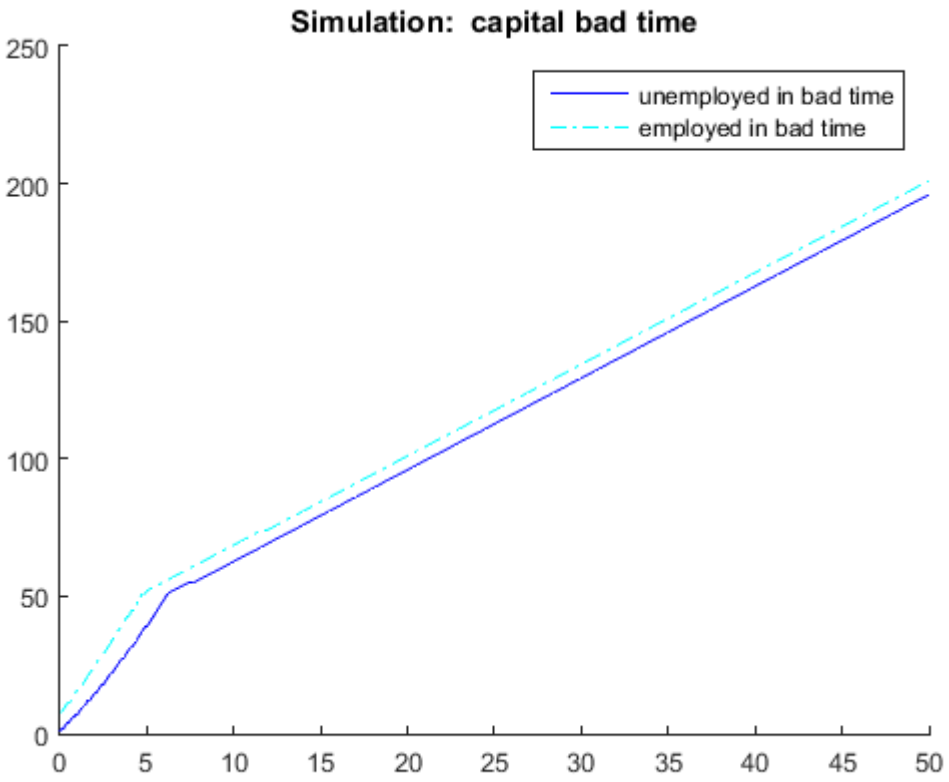

Figure 4: Simulation: capital in bad time

3 Solution of the model

- $R_g^2 = 0.9993$
- $R_b^2 = 0.9991$

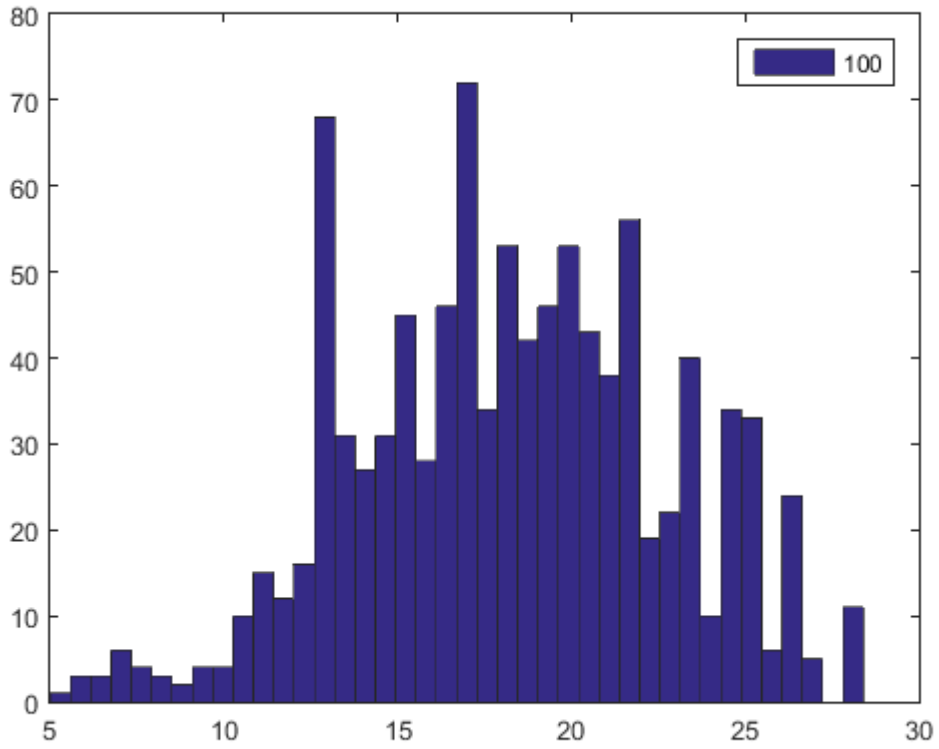

Figure 5: Asset distribution

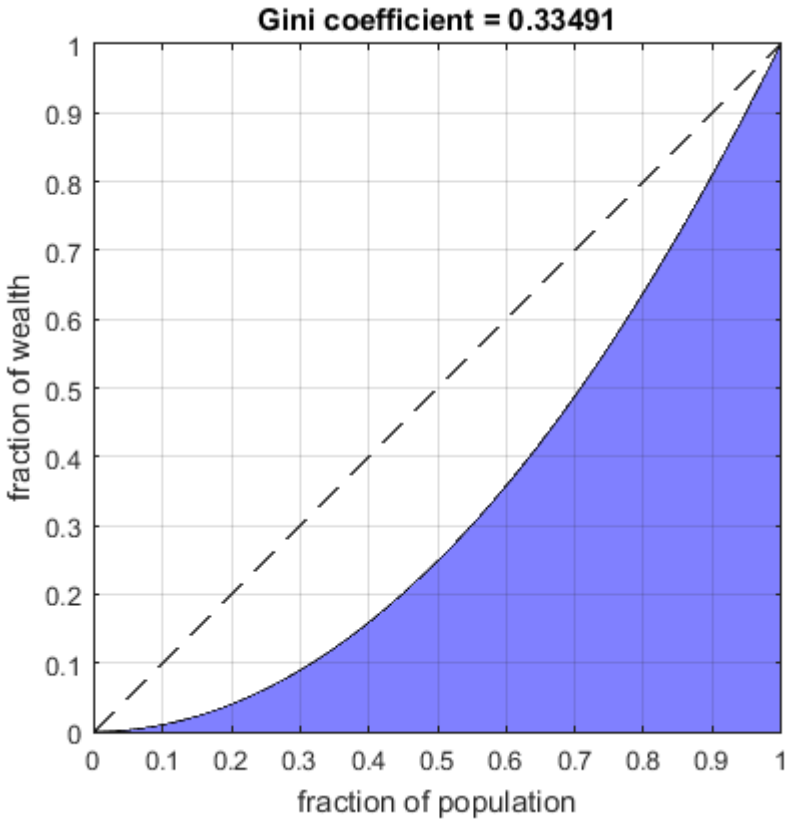

Figure 6: Lorenz curve of the economy

3.1 Model with two types of agents

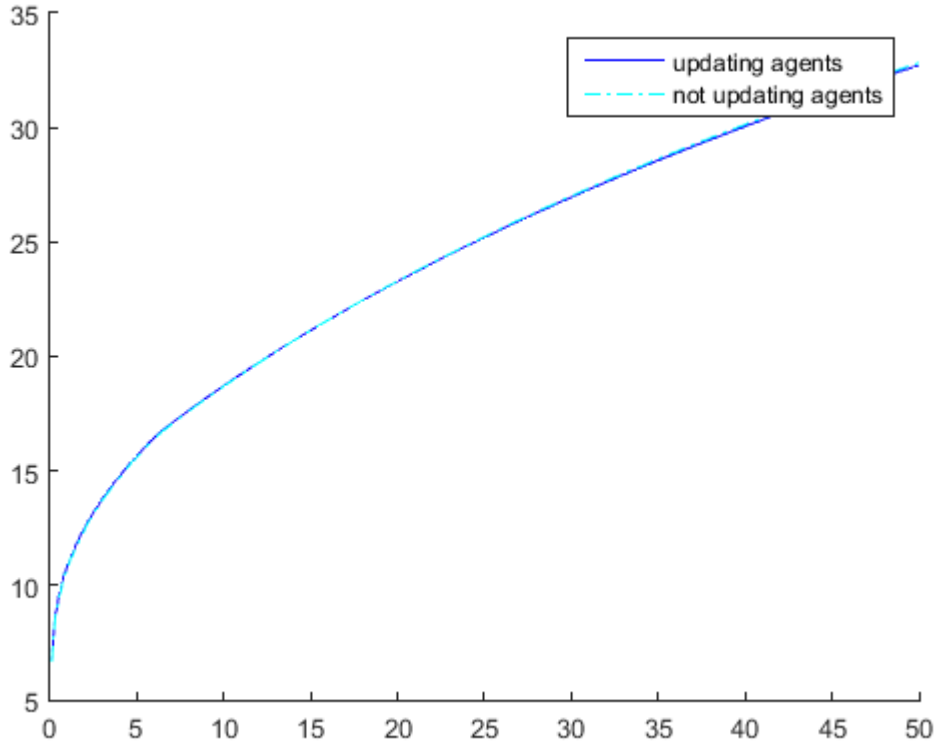

Figure 7: Welfare comparison in good time of unemployed

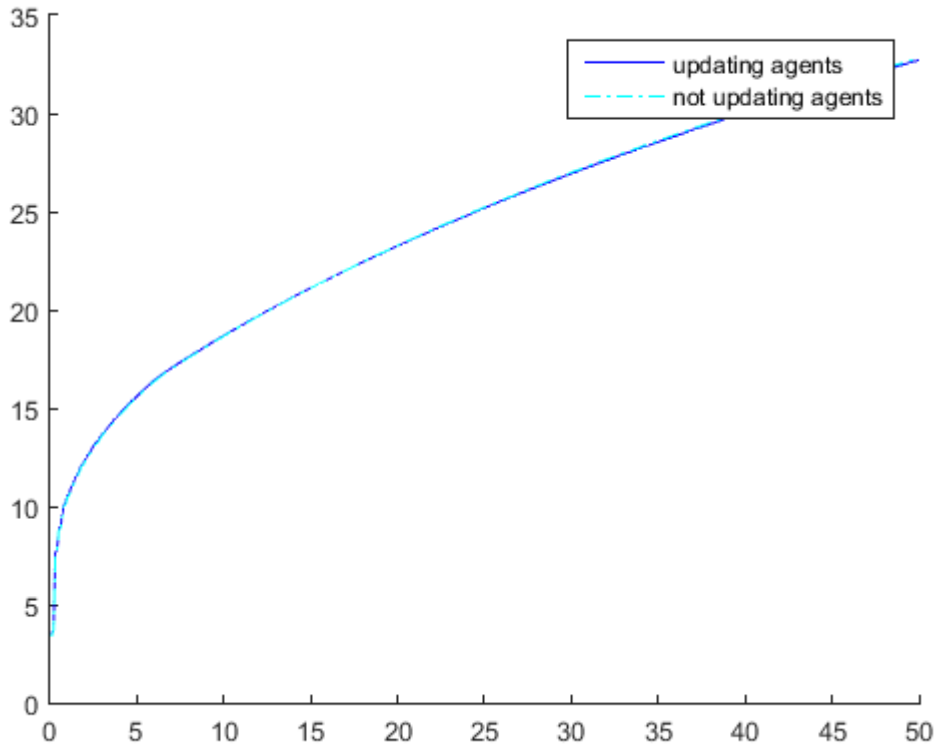

Figure 8: Welfare comparison in good time of employed

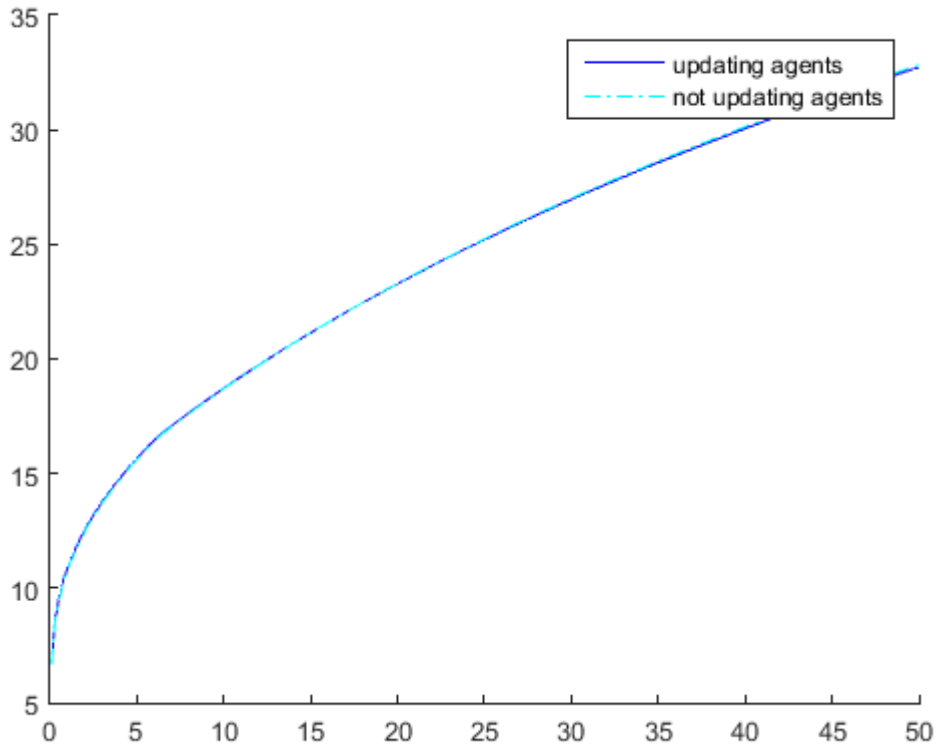

Figure 9: Welfare comparison in bad time of unemployed

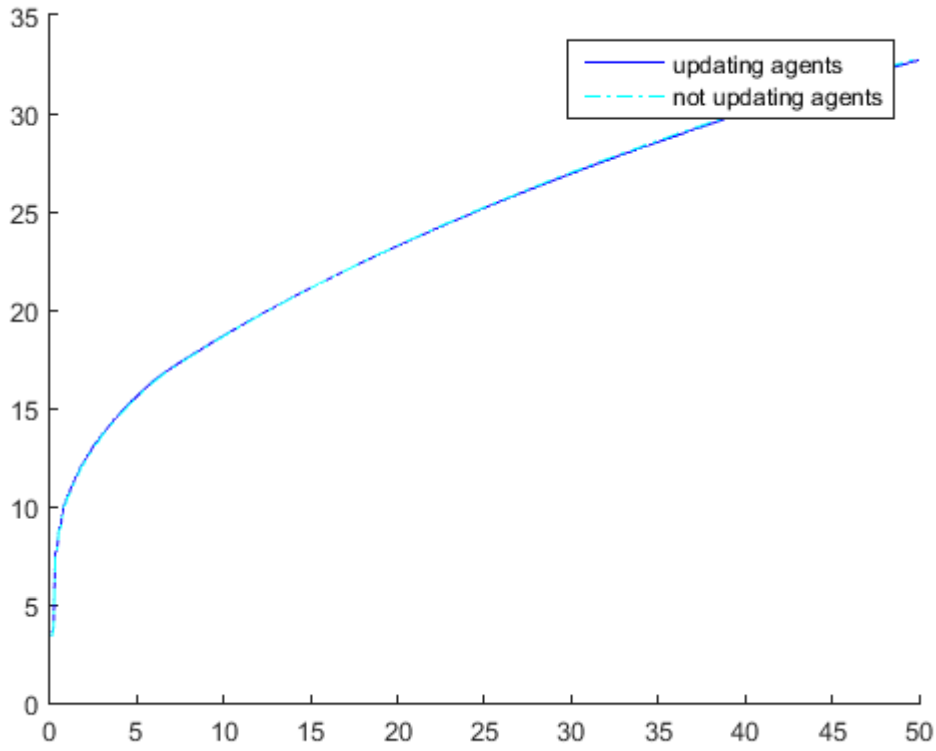

Figure 10: Welfare comparison in bad time of employed