University of Minnesota
ECON 8581
Homework 1
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A Simplified Version of Ljungqvist and Sargent (1998)

In this file, we solve a simplified version of the model proposed by Ljungqvist and Sargent (1998). I discretized the grids and solved the Bellman equations iterating the value functions for both employed/unemployed agents.

$$U(h) = \max_{s}(1-\tau)b - c(s) + \beta(1-\alpha)\left[\pi(s)\int_{w}\max\left\{W(w,h'),U(h')\right\}dF(w) + (1-\pi(s))U(h')\right]$$

$$st. \quad h' = \max\{h - \psi_U\Delta, \underline{h}\}$$

$$W(w,h) = (1-\tau)wh + \beta(1-\alpha)\left[(1-\lambda)W(w,\min\{h+\Delta,\bar{h}\}) + \lambda U(\max\{h-\psi_F\Delta,\underline{h}\})\right]$$

Table 1: Parameters

Parameter	Description	Value
β	Discount factor (2 weeks)	0.9985
α	Prob. Of dying	0.0009
λ	Prob. Of being laid off	0.009
ψ_F	Layoff loss	30
ψ_U	Unemployment loss	10
μ	mean of wage distribution	0.5
σ^2	variance of wage distribution	0.1
b	Unemployment benefit	0.1

As suggested we solved the model according to the following steps[1]

1. Guess τ
2. Solve the Bellman equations for employed/unemployed agents
3. Compute the reservation wage and the optimal effort policy

[1] The MATLAB code used can be found here

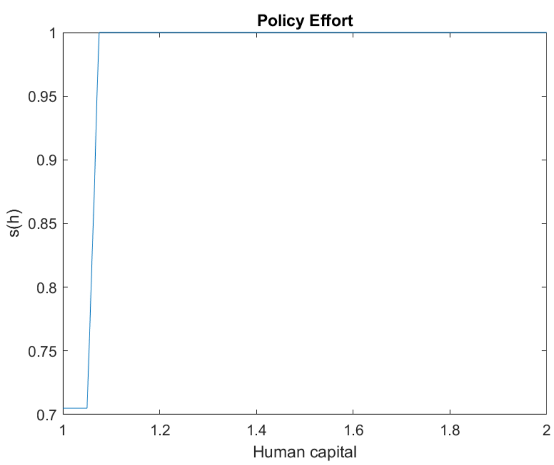
4. Simulate the model for $N = 10,000$ agents and $T = 500$ periods. Discard the first 100 periods and compute the distribution of agents, G.

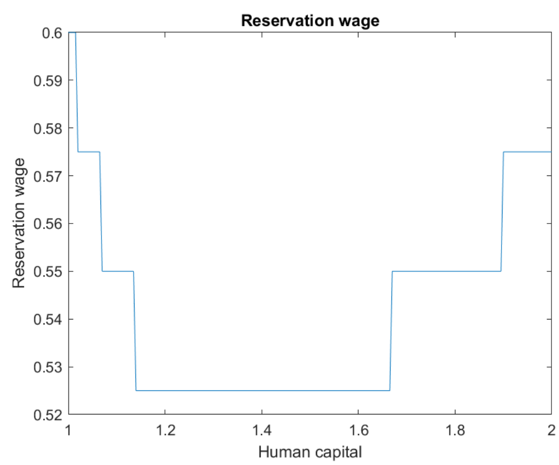
5. Using the distribution of agents and policy functions, compute the government budget equation:

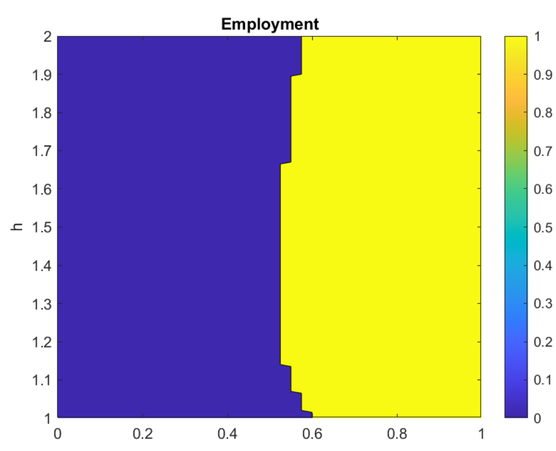
$$\mathcal{B}(\tau) := \int_h (\tau - 1)b\,dG(U,h) + \int_h wh\tau\,dG(W,h)$$

6. Use a bisection to find $\mathcal{B}(\tau^*) = 0$.

Following the above algorithm I found that a tax $\tau^* = 1.75\%$ can finance the unemployment benefits. Next, I exhibit the effort policy, the reservation wage, and the map of employment.







References

L. Ljungqvist and T. J. Sargent. The european unemployment dilemma. *Journal of political Economy*, 106(3):514–550, 1998.