

3. Consider the following model of employment adjustment costs at the micro level. The firm maximizes the present discounted value of profits. The value function is given by:

$$V(A, L_{-1}) = \max R(A, L, H) - \omega(L, H) - C(L_{-1}, L) + \beta EV(A', L)$$

where:

$$R(A, L, H) = A(LH)^\alpha$$

$$\omega(L, H) = L(w_0 + w_1 H^\xi)$$

$$C(L_{-1}, L) = F(I) + (v/2)((L - L_{-1})/L_{-1})^2$$

where A is a profit shock, L is employment, H is hours per worker, L_{-1} is the inherited stock of workers at the beginning of the period, I is an indicator variable which is equal to zero if $L = L_{-1}$ and equal to 1 otherwise, β is a fixed discount factor, $\alpha, \xi, v, F, w_0, w_1$ are all positive constants, and a prime reflects the next period's values. Answer the following questions:

- Suppose that $F=v=0$. Derive the optimality conditions for hours and employment. Discuss the properties of the optimum. What is the role of ξ in this context? Discuss.
- Suppose $v>0$ and $F=0$. Derive the optimality conditions for hours and employment. How does the solution to this specification compare to your answer to a? Discuss.
- Suppose $v=0$ but $F>0$. Derive the optimality conditions for hours and employment (Hint: at least the form of the solution). How does the solution to this specification compare to your answers to a and b? Discuss.
- Suppose $v>0$ and $F>0$. Derive the optimality conditions for hours and employment (Hint: at least the form of the solution). How does the solution to this specification compare to your answers to a, b, and c?