Professor: *Benjamin Griffy*
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AECO 701

# Problem Set 6

**Problem 1: Solving the McCall Model** Consider a McCall model of labor market dynamics. Agents can be in one of two states: employed or unemployed. When unemployed, agents receive a job offer at rate $\lambda$ and enjoy $b$ units of leisure utility. Any job offer they receive is a wage $w$ drawn from a known distribution $F(\cdot)$ with support $[\underline{w}, \bar{w}]$. Once employed, workers receive $w$ income as utility (agents are risk neutral), and separate from their employer at rate $\delta$. They discount the future at rate $\beta$ and time is discrete. The Bellman Equation of an unemployed worker is given by

$$U = b + \beta[\lambda \int_{\underline{w}}^{\bar{w}} \max\{V(w), U\} dF(w) + (1-\lambda)U] \tag{1}$$

The Bellman Equation of an employed worker is given by

$$V(w) = w + \beta[(1-\delta)V(w) + \delta U] \tag{2}$$

**a)** Define the equilibrium in this model.

**b)** Solve for an analytical expression that characterizes the reservation wage. This will be an implicit function. Recall that the reservation wage is defined as $V(w_R) = U$.

**c)** Assume the following values and functional forms (from Hornstein, Krussell, Violante, 2011): $\lambda = 0.43$, $b = 0.4$, $\delta = 0.03$, $\beta = 0.99$, and $F(\cdot)$ is distributed log-normally with $\mu = 0.5, \sigma = 2.5$. Solve for the numerical value of the reservation wage in this context (use fsolve on your expression for $w_R - f(w_R) = 0$).

**d)** Now, instead of solving the reservation wage equation directly, use value function iteration on the two Bellman equations. To do this, set up a grid of wages over the wage distribution and iterate to convergence. Compare your solutions. Choose $V(w)_0 = 0$ and $U = 0$ as your initial points (you could also choose $V(w)_0 = \frac{b}{1-\beta}$ and $U = \frac{b}{1-\beta}$. Why?)