Firms

$$s_{jt} = \lambda \log \in_{jt} + (1-\lambda) \log Z_t + v_{jt}$$

$$s_{jt} = \lambda \varepsilon_{jt} + (1-\lambda) z_t + v_{jt}$$

$$Y_t \equiv \left[\int_0^1 \in_{jt}^{1/\theta} Y_{jt}^{(\theta-1)/\theta} dj \right]^{\theta/(\theta-1)}$$

$$\max_{Y_{jt}} E \left\{ P_t \left[\int_0^1 \in_{jt}^{1/\theta} Y_{jt}^{(\theta-1)/\theta} dj \right]^{\theta/(\theta-1)} - \int_0^1 P_{jt} Y_{jt} dj \right\}$$

$$Y_{jt} \equiv \left(\frac{P_{jt}}{P_t} \right)^{-\theta} \in_{jt} Y_t$$

$$Y_t(j) = A_t N_t(j) K_t(j)$$

$$\log A_t = (1-\rho_A) \log(\bar{A}) + \rho_A \log(A_{t-1}) + e_{At}$$

$$\Pi_{jt} = P_{jt} Y_{jt} - W_t N_{jt} - R_t K_{jt}$$

$$\max_{N_{jt}, K_{jt}} E \left[\left(P_t Y_{jt}^{-\frac{1}{\theta}} [\in_{jt} Y_t]^{\frac{1}{\theta}} Y_{jt} - W_t N_{jt} - R_t K_{jt} \right) \middle| S_{jt} \right]$$

$$\left(1-\frac{1}{\theta}\right) \left[A_t K_{jt} \right]^{1-\frac{1}{\theta}} N_{jt}^{-1/\theta} P_t E \left[[\in_{jt} \; Z_t]^{1/\theta} \middle| s_{jt} \right] - W_t = 0$$

$$\left(1-\frac{1}{\theta}\right) Y_{jt}^{1-\frac{1}{\theta}} P_t E \left[[\in_{jt} \; Z_t]^{1/\theta} \middle| s_{jt} \right] = W_t N_{jt}$$

Get Logarithm

$$\log(1-\frac{1}{\theta})+(1-\frac{1}{\theta})y_{jt}+p_t+E\left[\frac{1}{\theta}\varepsilon_{jt}+\frac{1}{\theta}z_t\left|s_{jt}\right.\right]=w_t+n_{jt}$$

$$E\left[\frac{1}{\theta}\varepsilon_{jt}+\frac{1}{\theta}z_t\left|s_{jt}\right.\right]=\frac{\operatorname{cov}\left(\frac{1}{\theta}\varepsilon_{jt}+\frac{1}{\theta}z_t,s_{jt}\right)}{\operatorname{var}(s_{jt})}s_{jt}=\frac{\frac{1}{\theta}\lambda\sigma_\varepsilon^2+\frac{1}{\theta}(1-\lambda)\sigma_z^2}{\lambda^2\sigma_\varepsilon^2+(1-\lambda)^2\sigma_z^2+\sigma_v^2}\left(\lambda\varepsilon_{jt}+(1-\lambda)z_t+v_{jt}\right)$$

$$\log(1-\frac{1}{\theta})+(1-\frac{1}{\theta})y_{jt}+p_t+\frac{\frac{1}{\theta}\lambda\sigma_\varepsilon^2+\frac{1}{\theta}(1-\lambda)\sigma_z^2}{\lambda^2\sigma_\varepsilon^2+(1-\lambda)^2\sigma_z^2+\sigma_v^2}\left(\lambda\varepsilon_{jt}+(1-\lambda)z_t+v_{jt}\right)=w_t+n_{jt}$$