Firms

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

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

Getting Logarithm

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

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

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

The clearing of market for good j

$$\log(1-\frac{1}{\theta}) + (1-\frac{1}{\theta})y_t + p_t + \frac{\frac{1}{\theta}\lambda\sigma_\varepsilon^2 + \frac{1}{\theta}(1-\lambda)\sigma_z^2}{\lambda^2\sigma_\varepsilon^2 + (1-\lambda)^2\sigma_z^2 + \sigma_v^2}\left(\lambda\varepsilon_t + (1-\lambda)z_t + v_t\right) = w_t + n_t$$

The steady state

$$\log(1-\frac{1}{\theta}) + (1-\frac{1}{\theta})\bar{y} + \bar{p} + \frac{\frac{1}{\theta}\lambda\sigma_\varepsilon^2 + \frac{1}{\theta}(1-\lambda)\sigma_z^2}{\lambda^2\sigma_\varepsilon^2 + (1-\lambda)^2\sigma_z^2 + \sigma_v^2}\left(\lambda\bar{\varepsilon} + (1-\lambda)\bar{z} + 0\right) = \bar{w} + \bar{n}$$

Linearization

$$(1-\frac{1}{\theta})\hat{y}_t+\hat{p}_t+\frac{\frac{1}{\theta}\lambda\sigma_\varepsilon^2+\frac{1}{\theta}(1-\lambda)\sigma_z^2}{\lambda^2\sigma_\varepsilon^2+(1-\lambda)^2\sigma_z^2+\sigma_v^2}\left(\lambda\hat{\varepsilon}_t+(1-\lambda)\hat{z}_t+v_t\right)=\hat{w}_t+\hat{n}_t$$