Conditional model for $c \mid e^*$

$$c_{it} \mid e_{it}^* \sim \text{Gamma}(\psi_{ct}\phi_{cit}, \psi_{ct})$$

$$\log(\phi_{cit}) = \mu_{ct} + \beta_t(e_{it}^* - \mu_{et})$$

Marginal model for e^*

$$e_{it}^* \sim \text{Beta}\left(\phi_{eit}\psi_{et}, (1 - \phi_{eit})\psi_{et}\right)$$

$$\text{logit}(\phi_{eit}) = \mu_{et} + \alpha_t(u_{0it} - \bar{u}_{0t})$$

$$= \mu_{et} + \alpha_t u_{0it}^*$$