Uncertainty Shocks in a Model of Effective Demand: Comment

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Introduction

- Do uncertainty shocks have big effects in macro models?
- Basu and Bundick (2017): demand uncertainty shocks generate meaningful declines in output and positive comovement between consumption and investment.
- Demand uncertainty is modeled as a stochastic volatility shock to a household's intertemporal preferences within an Epstein and Zin (1991) recursive preference specification.
- If the distributional weights on current and future utility do not sum to 1, there is an asymptote in the response to the shock with unit intertemporal elasticity of substitution (IES).
- In BB the sum of the weights is not 1 and the IES is 0.95, so the asymptote significantly magnifies the responses.

Preference Specification

- BB preferences:

$$U_t^{BB} = [a_t(1-\beta)u(c_t,n_t)^{(1-\sigma)/\theta} + \beta(E_t[(U_{t+1}^{BB})^{1-\sigma}])^{1/\theta}]^{\theta/(1-\sigma)}$$

- Distributional weights: $a_t(1-\beta)$ and β. If $a_t = 1$ for all t,

$$U_t^{BB} = u(c_t,n_t)^{1-\beta}(E_t[(U_{t+1}^{BB})^{1-\sigma}])^{\beta/(1-\sigma)},\ \psi = 1$$

- When $a_t \neq 1$, the weights do not sum to 1 and

$$\lim_{\psi\to 1^-} U_t^{BB} = 0\ (\infty) \text{ for } a_t > 1\ (< 1),$$
$$\lim_{\psi\to 1^+} U_t^{BB} = \infty\ (0) \text{ for } a_t > 1\ (< 1).$$

- Alternative preferences:

$$U_t^{ALT} = \begin{cases} [(1-a_t\beta)u(c_t,n_t)^{(1-\sigma)/\theta} + a_t\beta(E_t[(U_{t+1}^{ALT})^{1-\sigma}])^{1/\theta}]^{\theta/(1-\sigma)} & 1 \neq \psi > 0 \\ u(c_t,n_t)^{1-a_t\beta}(E_t[(U_{t+1}^{ALT})^{1-\sigma}])^{a_t\beta/(1-\sigma)} & \psi = 1 \end{cases}$$

Endowment Economy

- Model Setup:
  - $c_0 = 1 - w$, $c_1 = rw$, $c_t = 1$ for $t \geq 2$
  - $a_t = 1$ for $t = 0, 2, 3, \ldots$
  - $a_1 = a^H = 1 + \Delta$ w.p. p and $a^L = 1 - \Delta$ w.p. $1 - p$
- Solve the model with the BB and alternative preferences
- Equilibrium (V^j: value function, $j \in \{BB, ALT\}$):
  - BB Preferences:

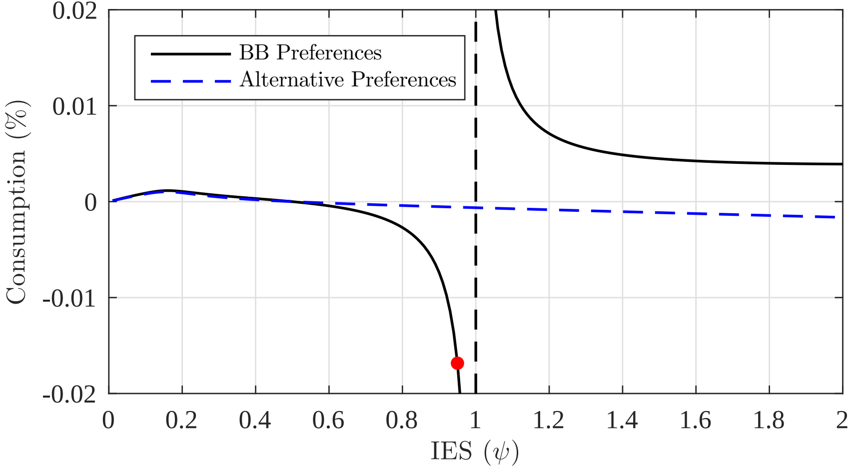
$$1 = \beta r E_0 \left[a_1 \left(\frac{c_0^{BB}}{c_1^{BB}} \right)^{1/\psi} \left(\frac{(V_1^{BB})^{1-\sigma}}{E_0[(V_1^{BB})^{1-\sigma}]} \right)^{1-\frac{1}{\theta}} \right]$$

  - Alternative preferences:

$$1 = \beta r E_0 \left[\left(\frac{1 - a_1 \beta}{1 - \beta} \right) \left(\frac{c_0^{ALT}}{c_1^{ALT}} \right)^{1/\psi} \left(\frac{(V_1^{ALT})^{1-\sigma}}{E_0[(V_1^{ALT})^{1-\sigma}]} \right)^{1-\frac{1}{\theta}} \right]$$

- Use nonlinear solver to back out c_0^j

Endowment Economy Asymptote (% change from no-uncertainty)



AUGMENTED DISCOUNT FACTOR

- Write the equilibrium condition as

$$1 = \tilde{\beta}^j r(c_0^j/c_1^j)^{1/\psi}$$

where $\tilde{\beta}$ is an *augmented* discount factor.

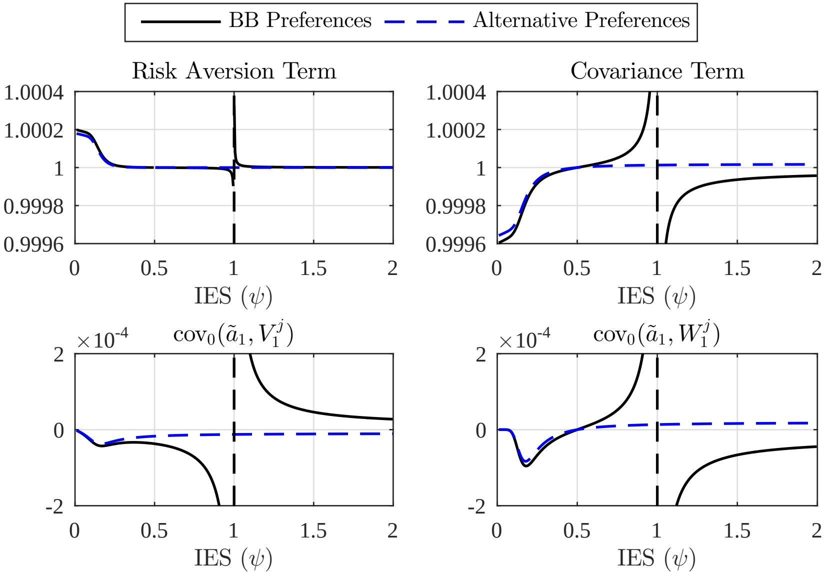
- Define $W_1^j \equiv (V_1^j)^{1/\psi-\sigma}$. Then

$$\tilde{\beta}^j \equiv \beta \times \underbrace{\frac{E_0[W_1^j]}{(E_0[(W_1^j)^{\theta/(\theta-1)}])^{(\theta-1)/\theta}}}_{\text{Risk Aversion Term}} \times \underbrace{\left(1 + \frac{\text{cov}_0(\tilde{a}_1^j, W_1^j)}{E_0[W_1^j]}\right)}_{\text{Covariance Term}}$$

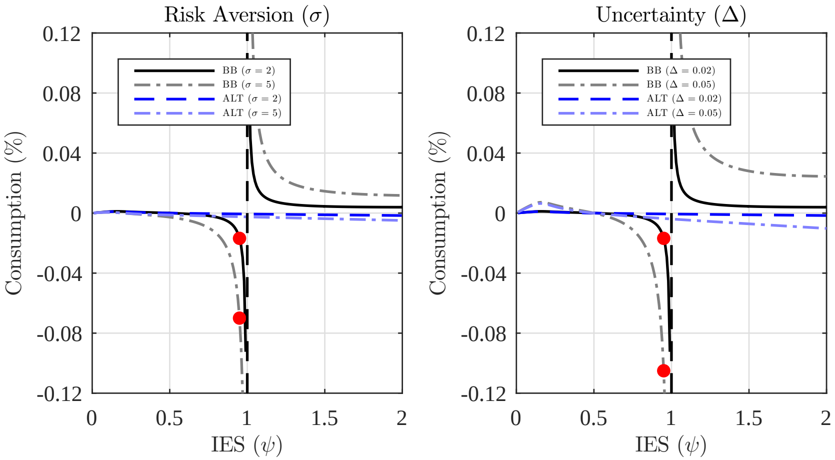
where $\tilde{a}_1^{BB} = a_1$ and $\tilde{a}_1^{ALT} = (1 - a_1\beta)/(1-\beta)$.

- Without loss of generality, evaluate $\tilde{\beta}^j$ at $c_1^j = \beta r/(1+\beta)$, no-uncertainty level of period-1 consumption when $\psi = 1$.

DECOMPOSITION



Risk Aversion and Uncertainty

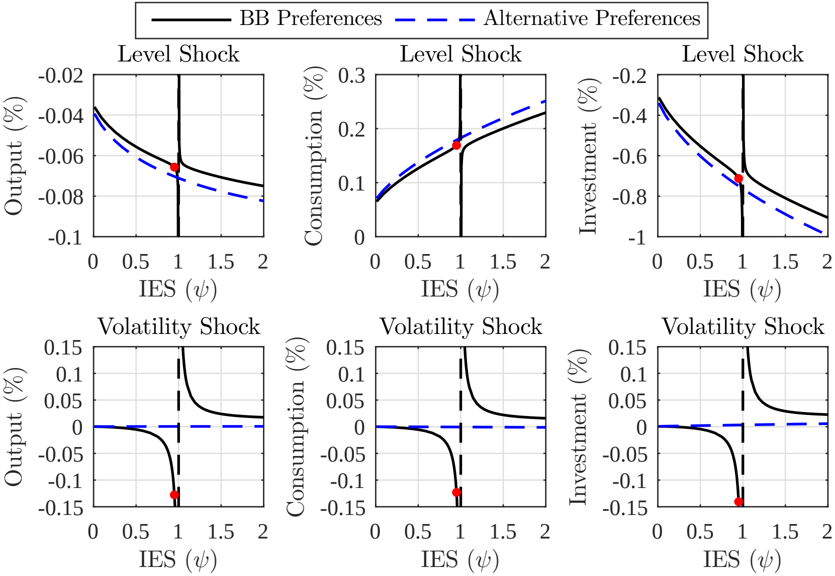


FULL BB MODEL

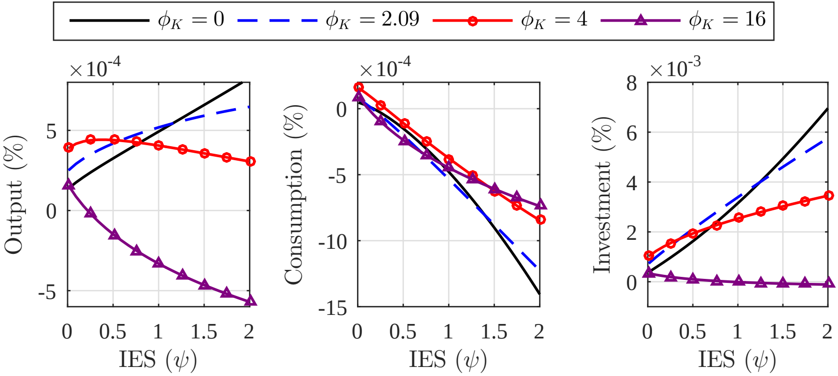
Textbook New Keynesian Model:

- Endogenous labor supply
- Endogenous investment with capital adjustment costs (ϕ_K)
- Variable capital utilization
- Sticky prices from Rotemberg price adjustment costs (ϕ_P)
- Central bank follows a Taylor rule
- Intertemporal preference (a) and technology shocks (z)
- Solved with third-order perturbation methods

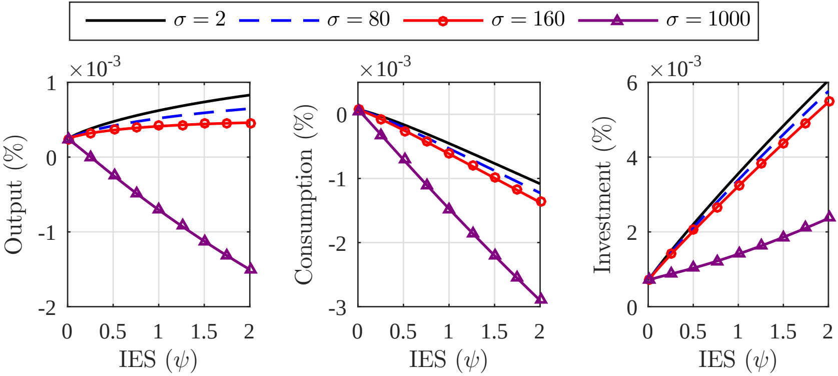
BB Model Asymptote



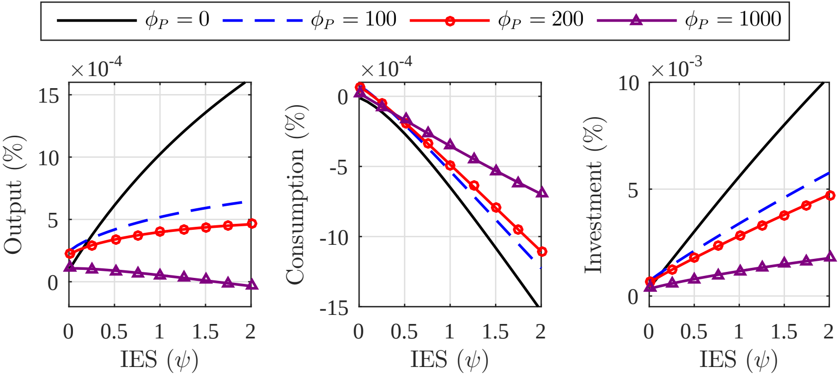
Alternative Preferences and Capital Adjustment Costs (Dashed Line: Baseline Value)



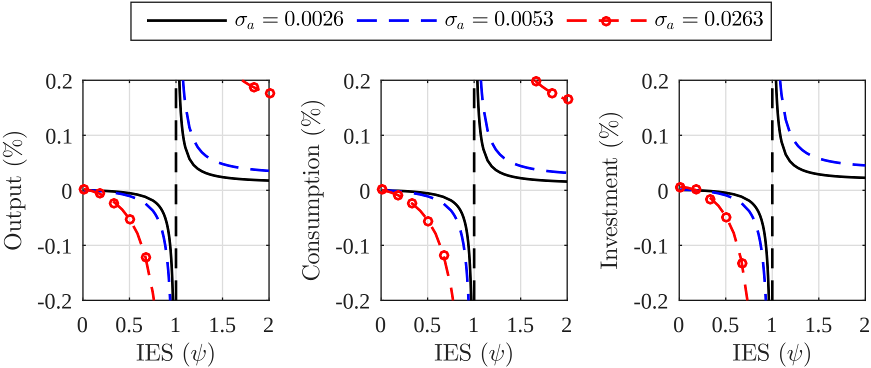
Alternative Preferences and Risk Aversion (Dashed Line: Baseline Value)



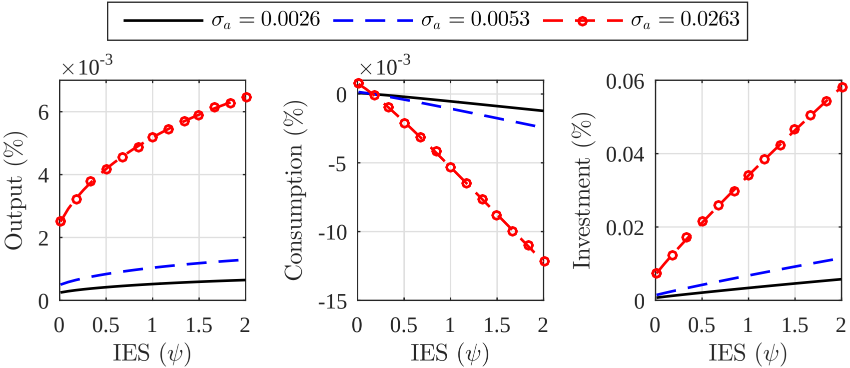
Alternative Preferences and Price Adjustment Costs (Dashed Line: Baseline Value)



BB Preferences Larger Shocks (Solid Line: Baseline Value)



ALT PREFERENCES LARGER SHOCKS (SOLID LINE: BASELINE VALUE)

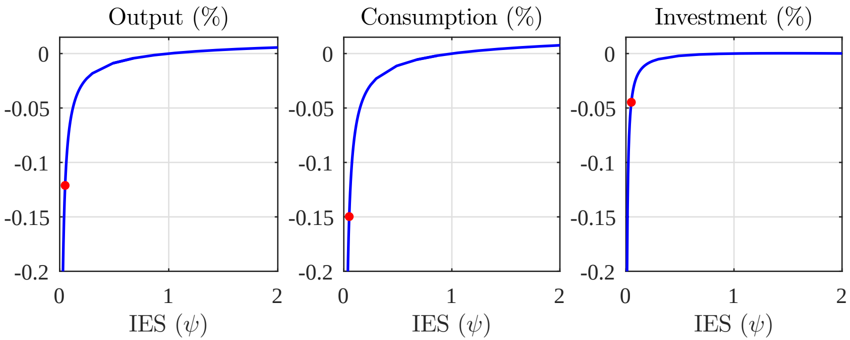


DISASTER RISK SHOCKS

- Preferences:

$$U_t^{BB} = [(1-\beta)(a_t^d u(c_t, n_t))^{(1-\sigma)/\theta} + \beta(E_t[(U_{t+1}^{BB})^{1-\sigma}])^{1/\theta}]^{\theta/(1-\sigma)}$$

- Asymptote no longer appears with $IES = 1$
- $a_t^d = (a_t^{BB})^{1-1/\psi}$, so the volatility of a_t^d rises as $IES \to 0$



Conclusion

1. BB results rest on an—until now—undetected asymptote
2. Without the influence of the asymptote, demand uncertainty shocks have very little effect on real activity
3. Future work: resolve the uncertainty puzzle—why models struggle to generate sizeable movements in economic activity in response to changes in uncertainty