Problem Set #2

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1. In a model with enforceable ensurance models, no aggregate uncertainty, and *ex ante* identical agents, there will be perfect smoothing across states, resulting in *ex post* identical allocations. Thus, each agent's household problem is represented by the following Bellman equation:

$$V(a_1, a_2, Z) = \max_{a_1', a_2'} \left\{ \log\left(S + a_1 + a_2 - q_1 a_1' - q_2 a_2'\right) + \beta \mathbb{E}\left[V(a_1', a_2', Z)|Z\right] \right\}$$

   Since allocations are identical, we do not need to solve for allocations computationally. We can use the first order conditions of this Bellman equation and the envelope condition to obtain policy functions (conditional on interest rates):

$$-\frac{q_i}{c} + \beta \frac{\partial \mathbb{E}\left[V(a_1', a_2', Z)|Z\right]}{\partial a_i'} = 0$$
$$\frac{\partial \mathbb{E}\left[V(a_1', a_2', Z)|Z\right]}{\partial a_i'} = \frac{1}{c'}$$
$$\Rightarrow \frac{c'}{c} = \frac{\beta}{q_i}$$

   Since there is no idiosyncratic uncertainty and complete markets, $c' = c$ in equilibrium, allowing us to solve for equilibrium interest rates:

$$q_1 = q_2 = \beta$$

   Furthermore, in equilibrium, $a_i = a_i'$