

Discussion of
“Winners and Losers in Housing Markets”
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Adding Aggregate Fluctuations

- ▶ Production

$$Y_t = F(A_t N_t, Z_{Yt}) = (A_t N_t)^{1-\eta} Z_{Yt}^\eta, \quad 0 < \eta < 1$$

- ▶ A_t grows at rate $\frac{A_t}{A_{t-1}} = G_{At}$
- ▶ Growth can take two values: G_A^b and G_A^g with $G_A^b < G_A^g$.
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- ▶ Producing tangible assets:

$$Z_t = L^{1-\gamma} K_t^\gamma$$

and

$$Z_t = Z_{Yt} + \int_0^{\bar{N}_t} h_t(i) di$$

The Representative Firm

- ▶ Controls L and K from previous period, issues contingent claims to finance investment.
- ▶ Q_t^b and Q_t^g prices of Arrow securities that pay one unit of consumption in bad and good states (in $t + 1$).
- ▶ $(p_t - r_t)$ net payment of the owner of tangible asset. Proceeds at $t + 1$ is q_{t+1}^j , $j = b, g$. No arbitrage implies:

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- ▶ Value of the firm

$$\begin{aligned} V_t^F &= q_t Z_{t-1} = \max_{I_t, N_t, Z_{Yt}} \{Y_t - w_t N_t - r_t Z_{Yt} - I_t + r_t Z_t + (p_t - r_t) Z_t\} = \\ &= \max_{I_t, N_t, Z_{Yt}} \{Y_t - w_t N_t - r_t Z_{Yt} - I_t + r_t Z_t + Q_t^g V_{t+1}^{F,g} + Q_t^b V_{t+1}^{F,b}\} \end{aligned}$$

Households

- ▶ Workers/retirees; Same demographic structure.
- ▶ Same preferences (distinction renting/owning)
- ▶ Uninsurable productivity risk (incomplete markets at the household level).
- ▶ Budget constraint for worker:

$$c_t + r_t h_t + Q_t^g s_t^g + Q_t^b s_t^b = (1 - \tau) w_t \epsilon_t + s_{t-1}^j$$

- ▶ Budget constraint for retiree:

$$c_t + r_t h_t + Q_t^g s_t^g + Q_t^b s_t^b = b_t + \frac{1}{\sigma} s_{t-1}^j$$

House Financing

- ▶ To be considered a homeowner, agent need to finance at least fraction $\theta \in [0, 1)$ of the house value.

$$a_t = Q_t^g s_t^g + Q_t^b s_t^b \geq \theta(p_t - r_t)h_t$$

- ▶ Tenants cannot borrow:

$$s_t^j \geq 0, \quad j = g, b$$

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$$z_t \geq h_t$$

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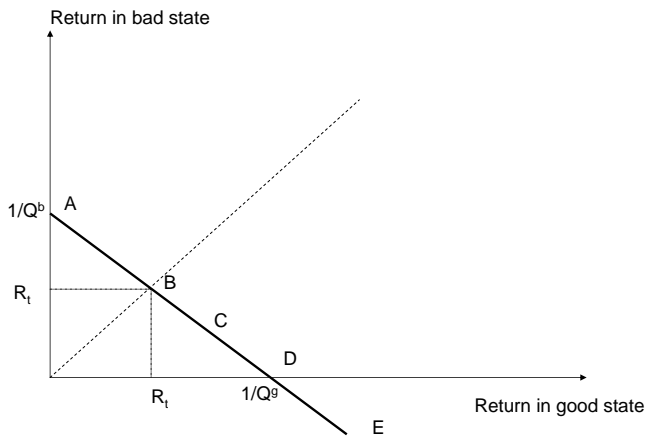
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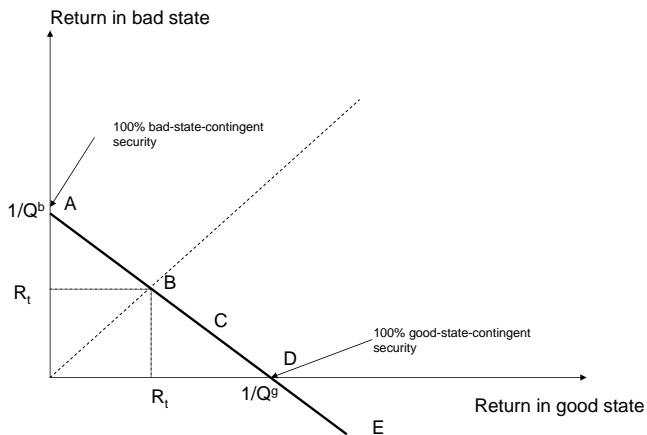
- ▶ And for the tenant,

$$z_t \geq 0, d_t \leq 0$$

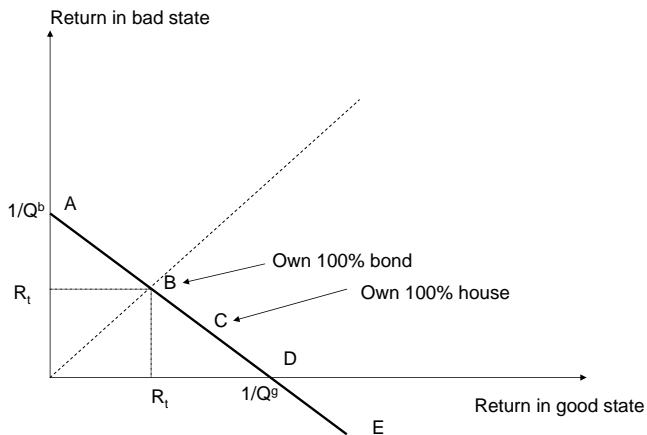
Portfolio Returns



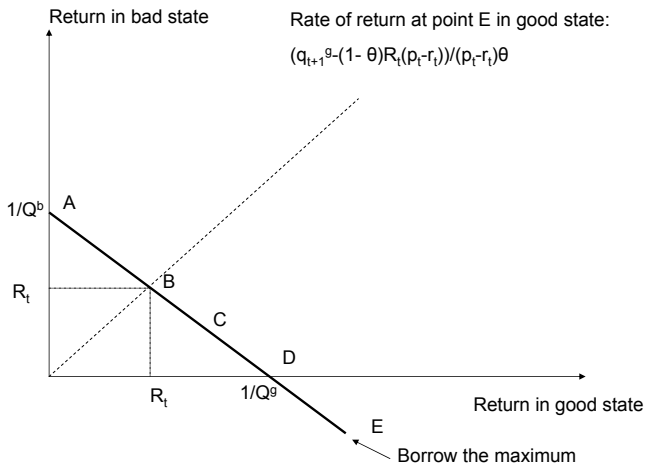
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- ▶ Looking forward to the results!