Understanding simple DSGE dynamics

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November 8, 2008

Basic DSGE Model

$$\max_{\{c_t, k_{t+1}, h_t\}} \mathrm{E} \sum_{t=1}^{\infty} \beta^{t-1} \left(\frac{c_t^{1-\nu} - 1}{1-\nu} + \bar{\eta} \frac{(1-h_t)^{1-\eta} - 1}{1-\eta} \right)$$

s.t.

$$c_t + k_t = \exp(z_t) k_{t-1}^{\alpha} h_t^{1-\alpha} + (1-\delta) k_{t-1}$$

$$z_t = \rho z_{t-1} + \varepsilon_t$$

$$k_1 \text{ given}, \quad \mathrm{E}_t[\varepsilon_{t+1}] = 0$$

Brock-Mirman model with endogoneous labor

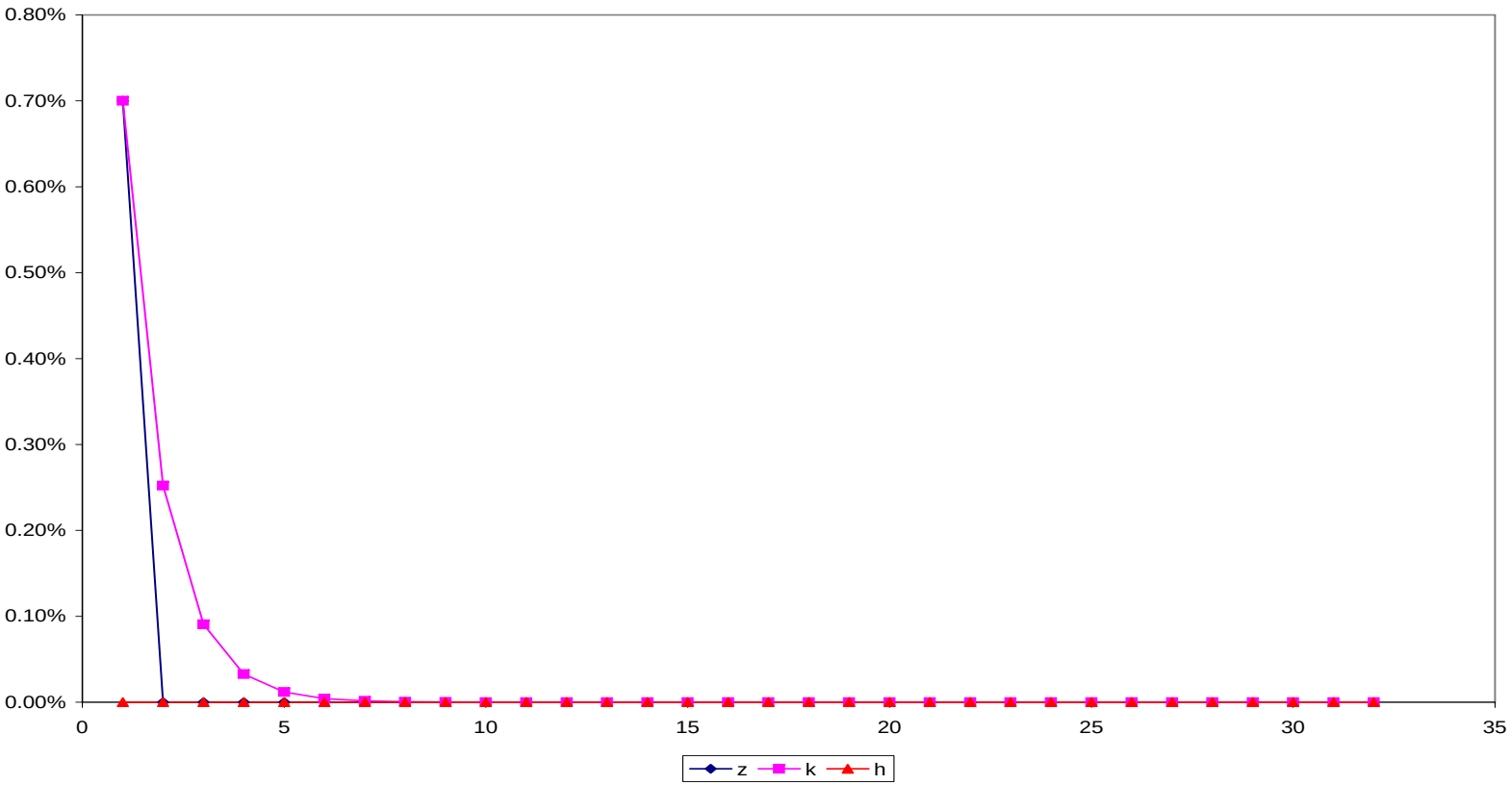
Key parameters:

$$\begin{aligned} \nu &= 1 \\ \delta &= 1 \end{aligned}$$

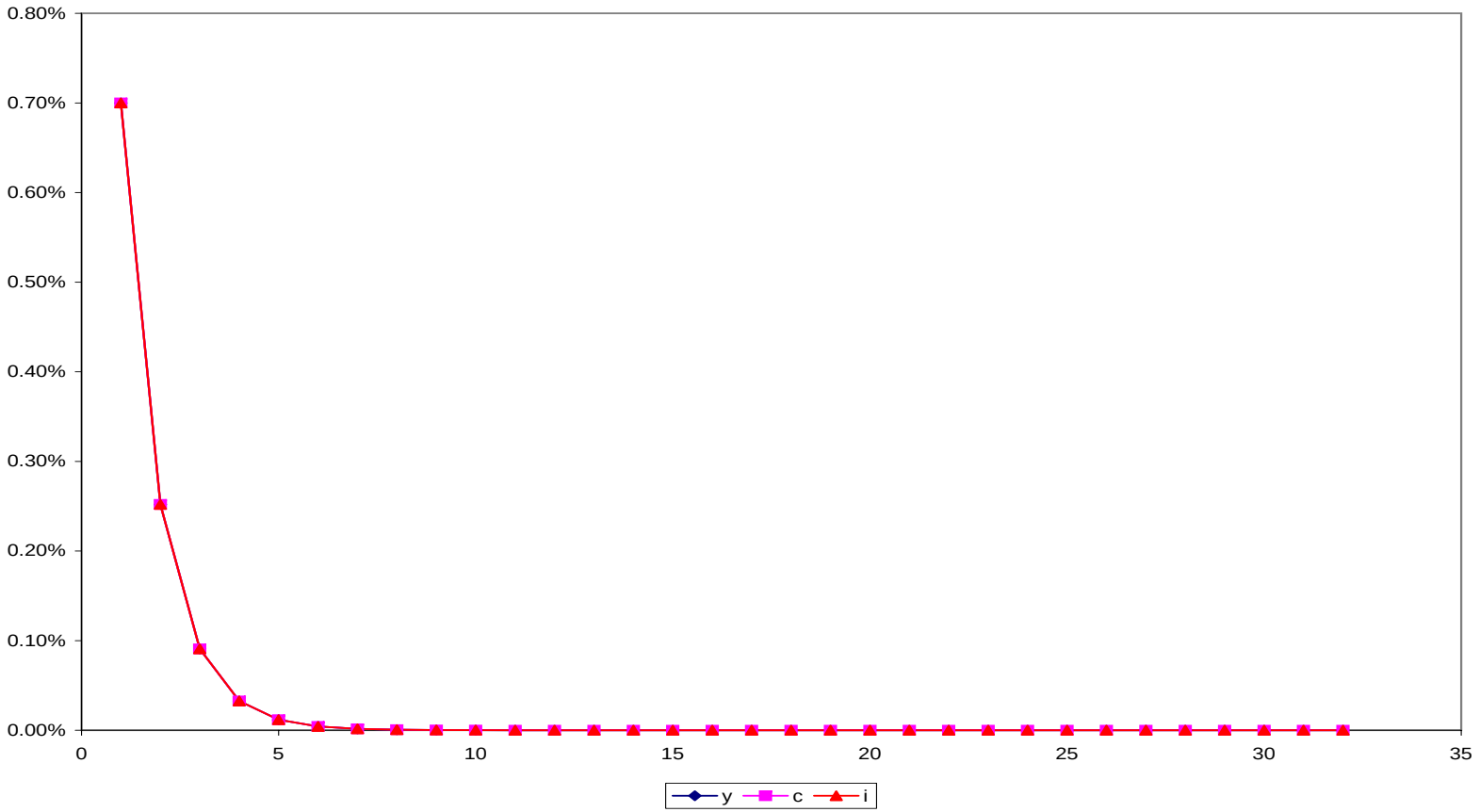
Other parameters

$$\begin{aligned} \bar{\eta} &= \eta = 1 \\ \sigma &= 0.007 \\ \rho &= 0 \end{aligned}$$

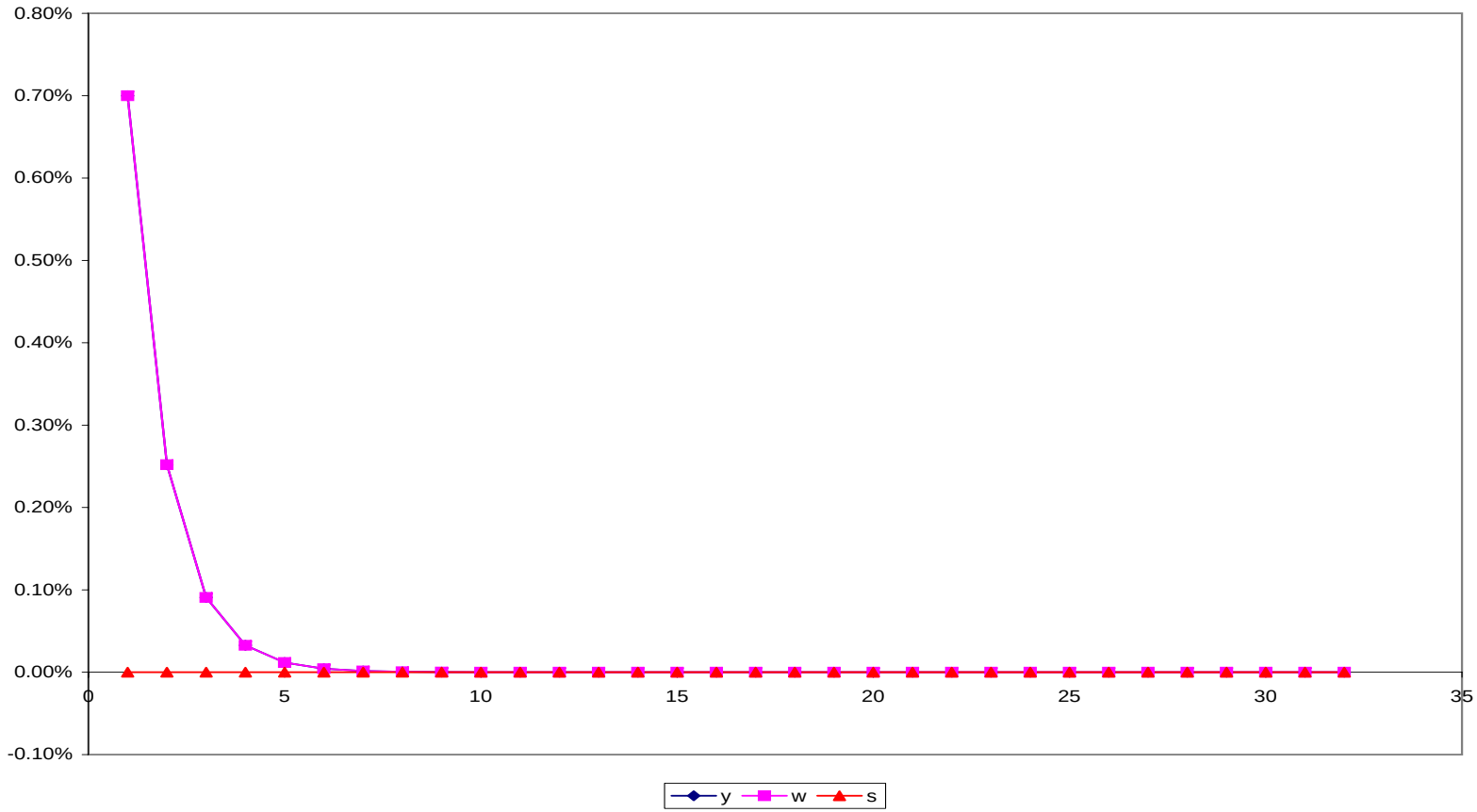
Z-K-H



Y-C-I



Y-W-S



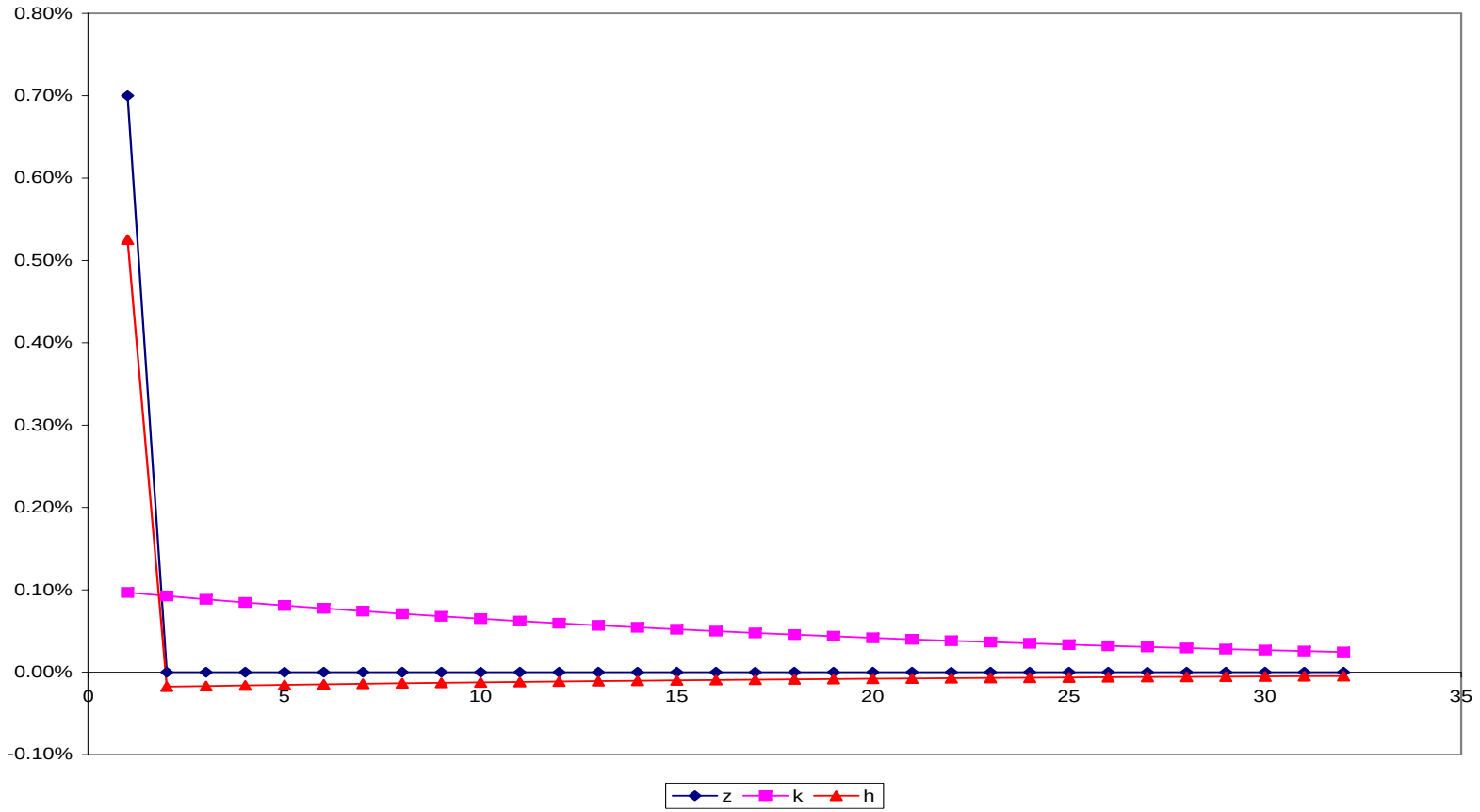
Lower depreciation

$$\delta = 0.025$$

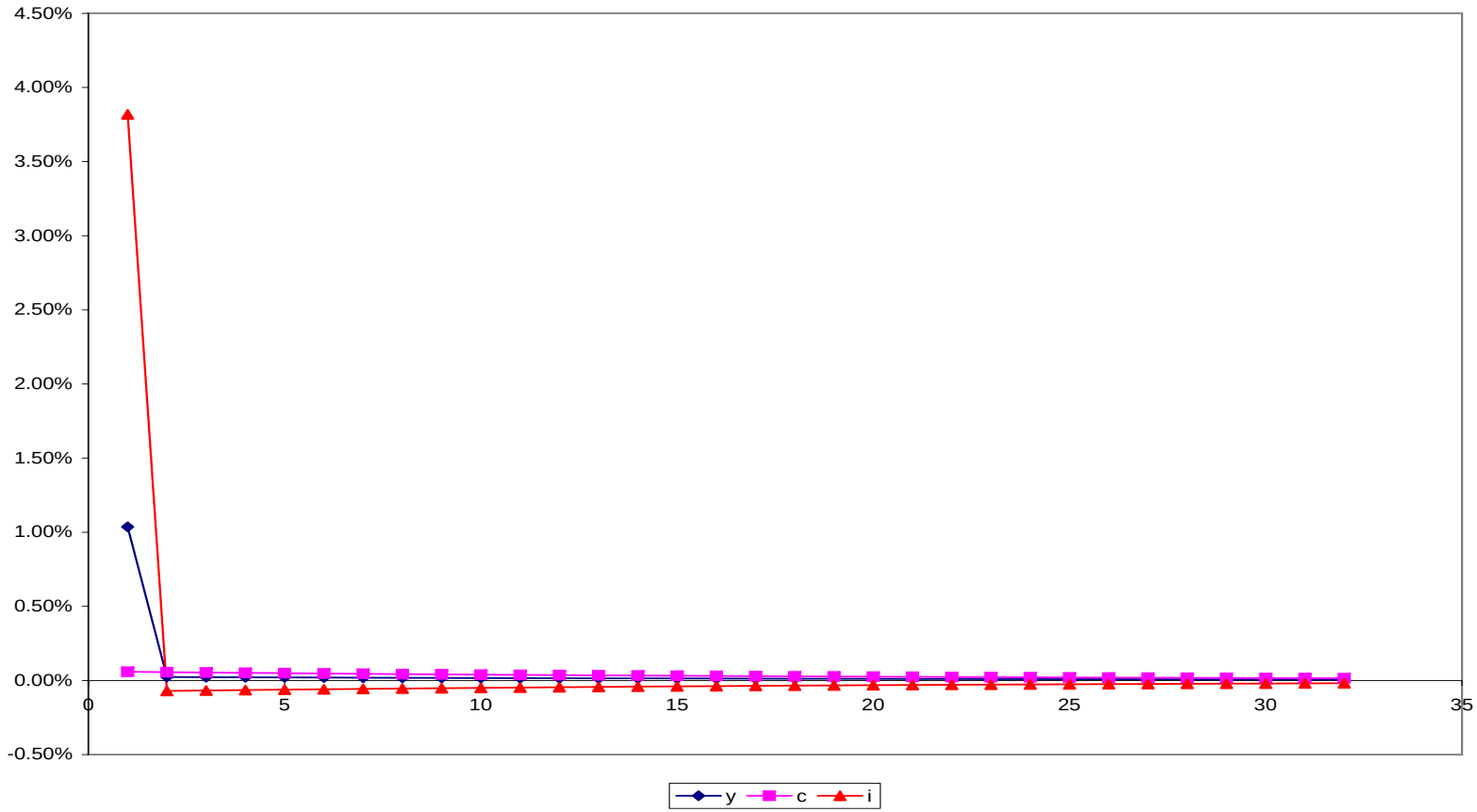
You would expect:

- More persistence because it is easier to carry over an increase in resources in period t into the future

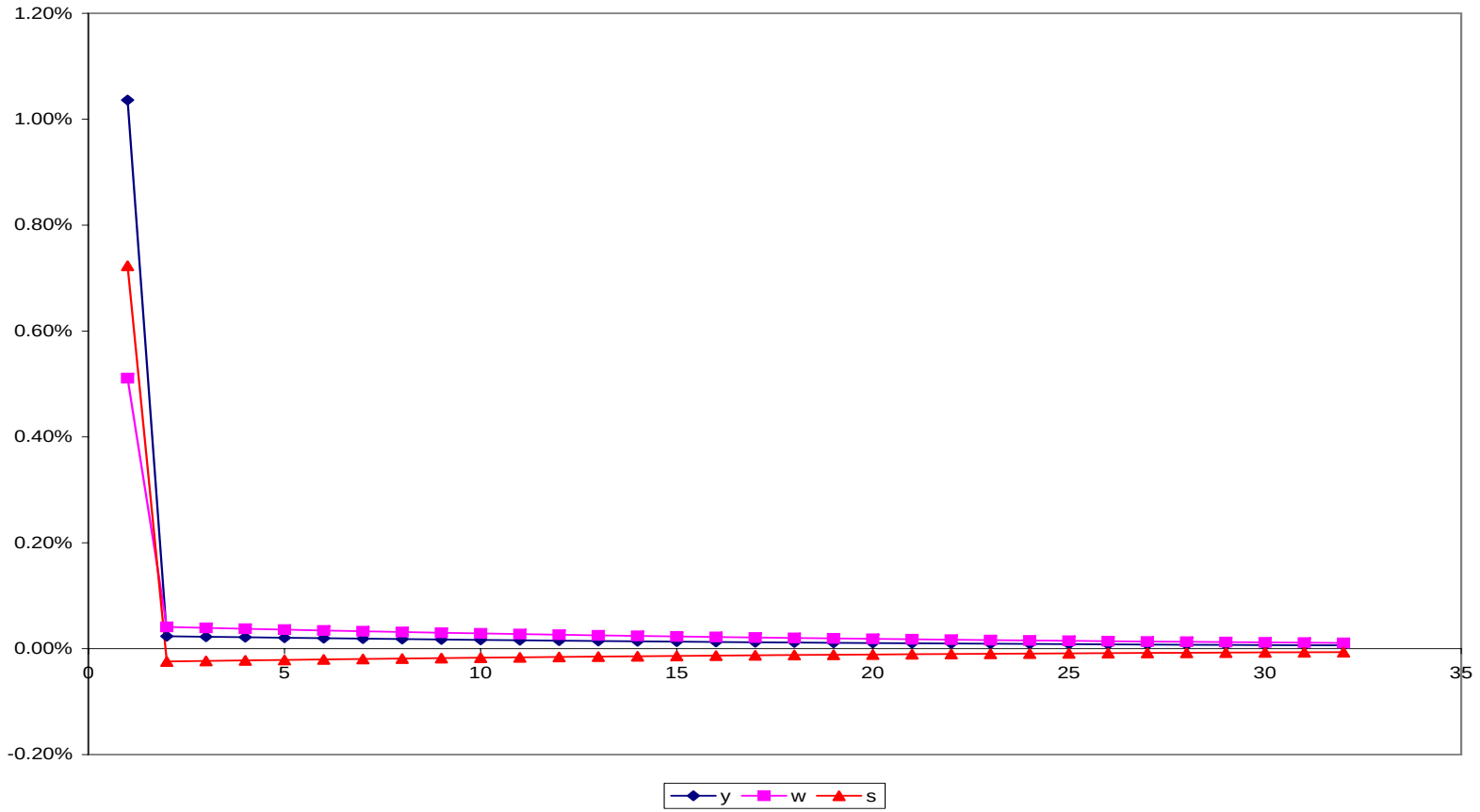
Z-K-H; low depreciation



Y-C-I; low depreciation



Y-W-S; low depreciation



Improvement?

- responses of Y, C, and I now have the right ranking
- hours response still not high enough
- much more persistence in c but not in other variables
- wage response still too volatile
- why does savings what it does?

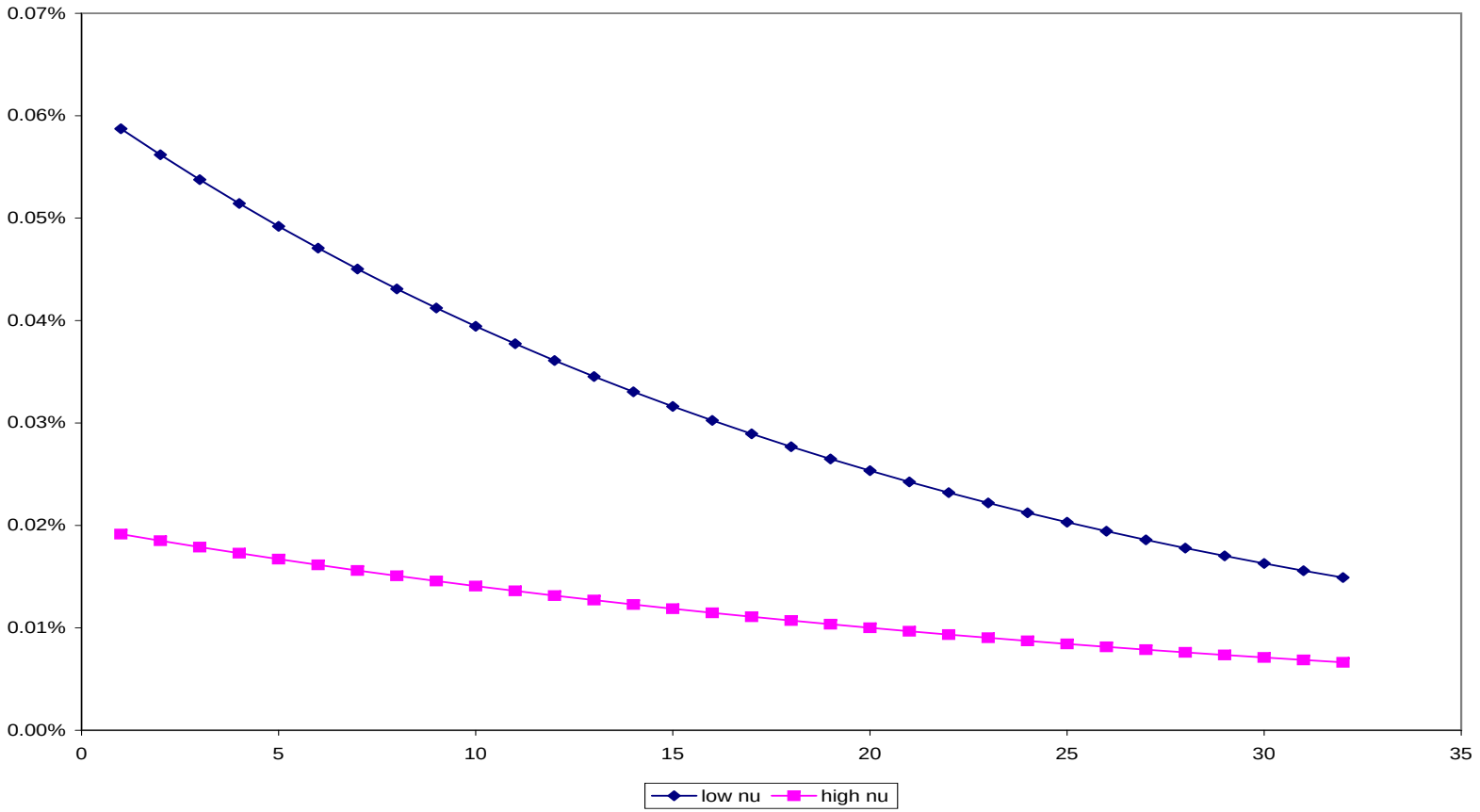
Lower intertemporal elasticity

$$v = 5$$

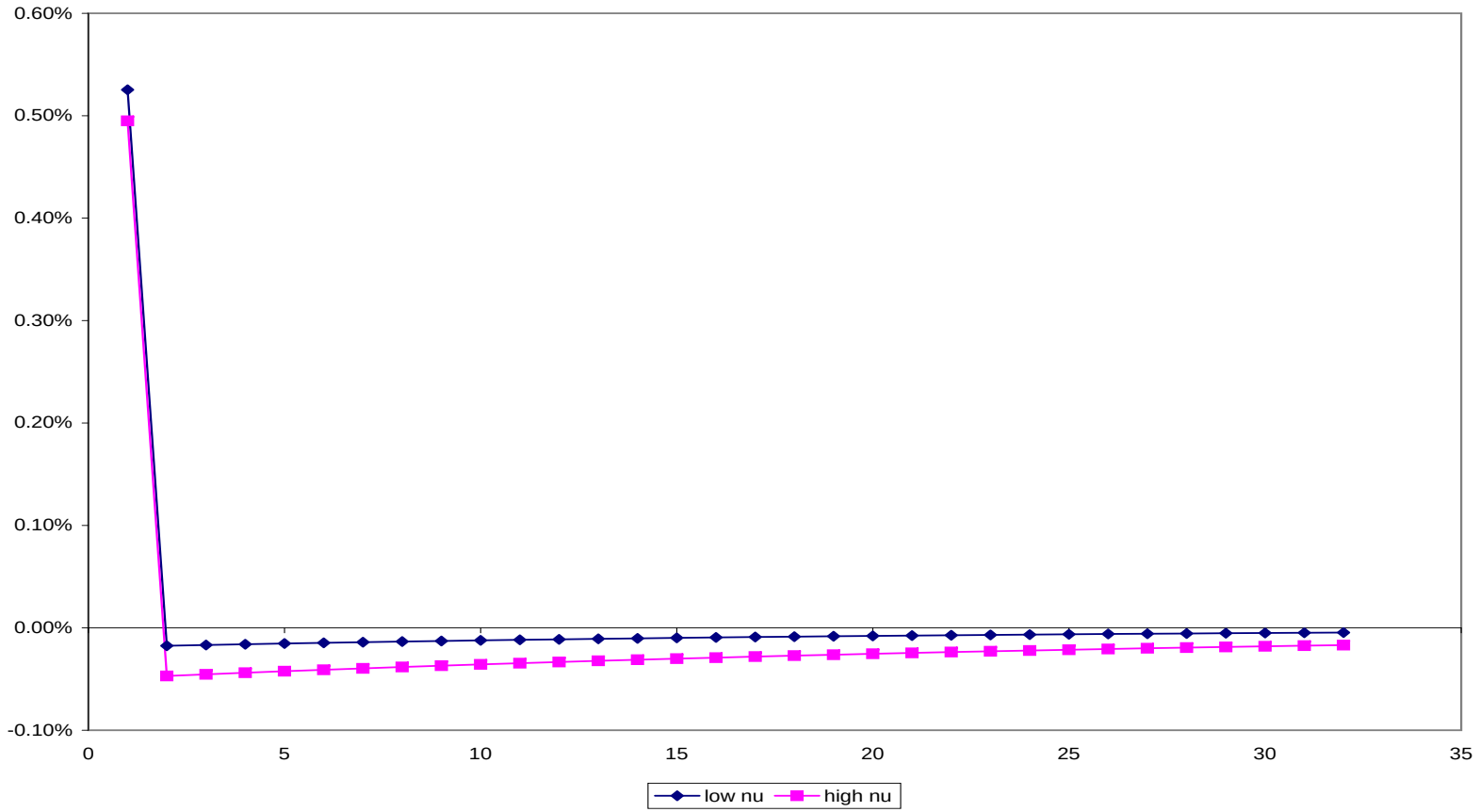
You would expect:

- Consumption to fluctuate less but consumption change more persistent

Consumption with low and high nu



Hours with low and high nu



Intuition

$$c^{-\nu} z \left(\frac{k_{-1}}{h} \right)^{\alpha} = (1-h)^{-\eta}$$

- c responds (increases) less for high ν
- $c^{-\nu}$ responds (drops) more for high ν
  - suggests bigger drop in h when z has returned to old level for high ν
- $c^{-\nu} z$ responds (increases) less for high ν
  - this suggests smaller increase in h during the first period for high ν

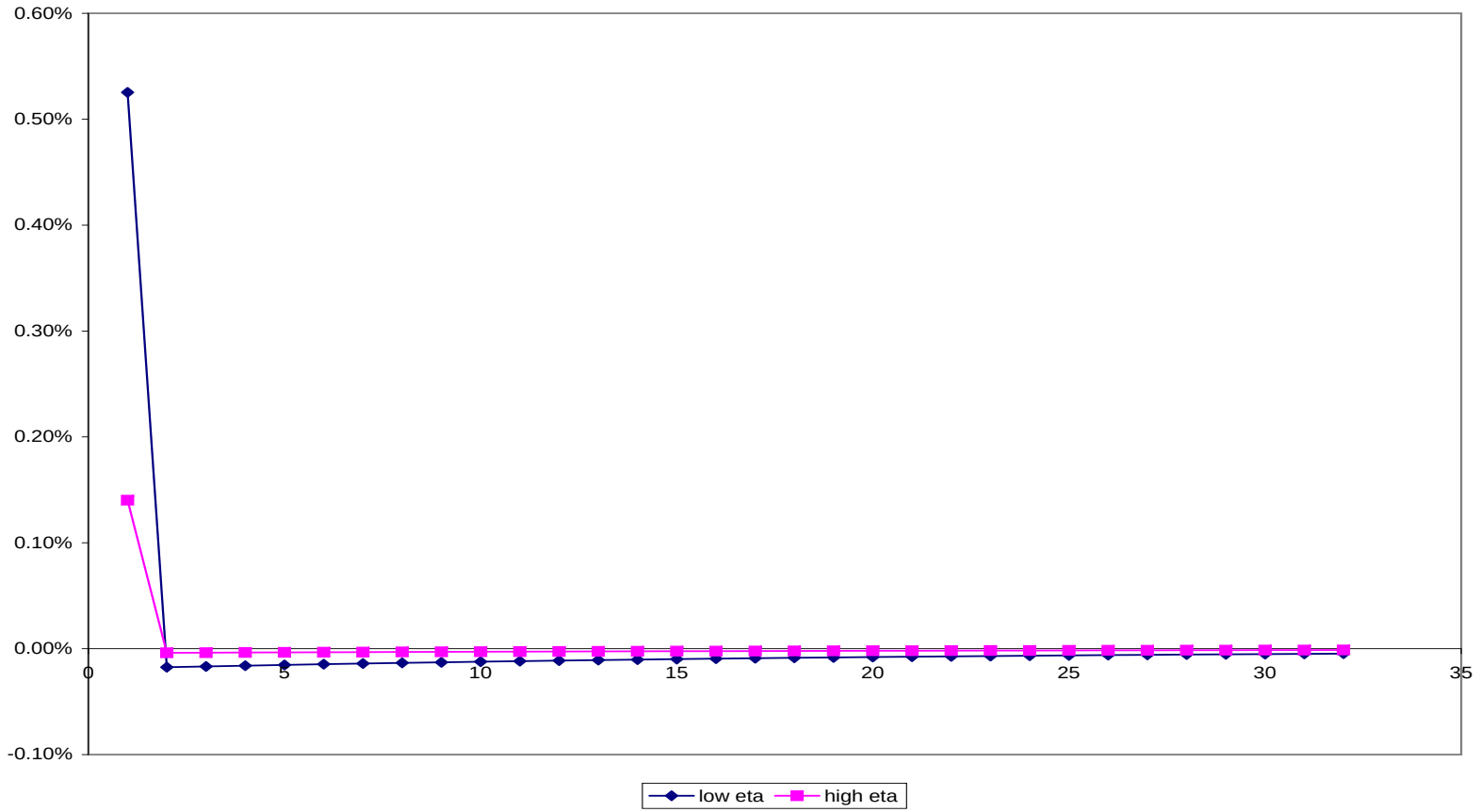
Lower labor supply elasticity

$$\eta = 5$$

You would expect:

- hours to respond by less

Hours with low and high eta



Consumption with low and high eta