Problem Set 3
Intertemporal Choice

1. Saving, Interest Rates, and Growth. PerfForesightCRRA shows that in a
perfect foresight infinite horizon CRRA-utility consumption model, the formula
for consumption

$$c_t = (h_t p_t + b_t) \kappa$$

implies that

$$c_t \approx \underbrace{p_t (1 - p_\gamma/(r - \gamma)) + (r - \rho^{-1}(r - \vartheta))b_t}_{\text{from human wealth}}$$

where

$$\gamma = \text{Growth rate of permanent noncapital income}$$

$$p_\gamma = \rho^{-1}(r - \vartheta) - \gamma$$

≡ ‘growth impatience rate’

a) Explain, in words, why the ‘return impatience condition’ $p_\gamma < 0$ needs to
be imposed in order for the model to have a sensible solution. Explain, in
words, why the ‘finite human wealth’ condition, $\gamma < r$ needs to be imposed.
Explain, in words, what imposing the ‘growth impatience condition’ $p_\gamma < 0$
accomplishes and why it might be desirable to impose that condition in an
infinite-horizon model. (Reminder: $p_t \equiv \rho^{-1}(r - \vartheta) - r$).

b) Use (2) and the fact that the level of saving $s$ can be defined as total income
minus total consumption:

$$s_t = ra_{t-1} + p_t - c_t$$

to show that the ratio of saving to permanent labor income $p_t$ is approximately

$$s_t \approx p_\gamma/(r - \gamma) + \rho^{-1}(r - \vartheta)a_{t-1}$$

and that the ratio of saving to total income (the ‘saving rate’) is

$$\varsigma_t = \frac{p_\gamma/(r - \gamma) + \rho^{-1}(r - \vartheta)a_{t-1}}{1 + ra_{t-1}}.$$  

c) Use the tools available at Econ-ARK/HARK to plot the relationship between
the saving rate and assets under various combinations of parameter values,
with the objective of exploring the sensitivity of saving to the model’s cali-

bration

d) Opinions about the long-term growth rate of income, $\gamma$, are widely divergent
today. Some scholars (e.g., Robert Gordon (2012)) believe that productivity
growth in the U.S. is likely to be slow, perhaps 1 percent, over the next 50
years, while others (e.g., Erik Brynjolfsson and McAfee (2014)) are consider-
ably more optimistic, projecting little if any slowdown from the growth rate
of 2.5 percent a year that has characterized the postwar period. Furthermore, beliefs about long-run growth have become considerably more pessimistic in the period since the Great Recession.

i. Explain why these facts cast doubt upon this model as a useful or reliable guide to understanding actual saving choices. Relate this point to the argument of Summers (1981) about the magnitude of the human wealth effect in perfect foresight models.

ii. Explain why the saving rate is higher in a TractableBufferStock model than in the perfect foresight model

iii. Using the same Jupyter notebook as before, compare the degree of sensitivity of the saving rate to the growth rate of income in this model compared to the perfect foresight model. Give the intuition for any differences.

2. In a Jupyter notebook, answer the following questions using a tractable buffer stock saving model.

a) Kreinin (1961) describes a fascinating natural experiment: In the late 1940s, Germany made reparations payments to Jewish Israeli citizens who had fled to Israel from Germany during World War II. For simplicity, suppose that all Israeli recipients of these payments were buffer stock savers, all recipients were employed at the same wage, and all of them had already reached their target level of savings at the time that the surprise one-time reparations payment reached them. Draw diagrams showing what the model predicts about the dynamics of the level of consumption, assets, and consumption growth following the receipt of the payments by Israeli citizens.

b) Now suppose that, while each recipient received the same amount of money, different recipients had very different levels of permanent wages. Specifically, suppose that there are “poor” and “rich” Israelis, and that for the poor ones the reparations payment is, say, a couple of years’ worth of permanent income, while for the rich ones the reparations payment is a small fraction of a year’s income. How would you expect the marginal propensity to consume (MPC) out of the payments to differ for poor versus for rich Israelis? If there is any difference in the MPC’s, explain it in intuitive terms.

c) Now consider the one-time “economic stimulus checks” that the U.S. government mailed to households in the summer of 2008, which were a small percentage of income for some households and a very small percentage for other households. Assume that these checks were treated by households as one-time windfalls, not to be repeated. Discuss whether the buffer stock theory suggests that the MPC out of these checks should be similar to, or different from, the Israeli experience, and discuss whether the experiences of “poor” or “rich” Israeli households might be more relevant.
References


