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Problem Set 10

ECON 3213
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Problem 1

a

In 2007,

$$NIIP = A - L = 20705 - 21984 = -1279 \text{ billions of \$}$$

In 2018,

$$NIIP = A - L = 25241 - 34796 = -9555 \text{ billions of \$}$$

b

In 2007,

$$NII = r^A A - r^L L \implies r^A = 2.85\%$$

In 2018,

$$NII = r^A A - r^L L \implies r^A = 4.12\%$$

c

The exorbitant privilege has increased in the US; NII has increased while $NIIP$ has declined, which is reflected in the fact that the difference between asset and liability returns has increased from 2.85% to 4.12%.

d

If $r^A = 2.85, r^L = 4.12$,

$$NII = r^A A - r^L L = -62.9 \text{ billions of \$}$$

We see that if the return differential had not increased, then the NII of the US would've been negative in 2018.

e

$$NII = r^A A - r^L L \implies A = 36497$$

Then, we can give a quantitative value to exorbitant privilege, which is the counterfactual difference of observed A and the needed A to generate the same NII holding r^A, r^L, and L constant. In this case, it is $36497 - 25241 = 11256$ in billions of USD.

Problem 2

1

We have that $CA_1 = -0.5(120) = -6$.
Since we have that $CA_t = TB_t + rB^*_{t-1}$,

$$TB_1 = CA_1 - rB^*_0 = -6 + 10 = 4$$

Then, $B^*_1 = CA_1 + B^*_0 = -6 - 100 = -106$

2

We compute $B^*_2 = CA_2 + B^*_1 = 0 \implies CA_2 = 106$. Then, we have that

$$TB_2 = CA_2 - rB^*_1 = 106 + 10.6 = 116.6$$

They are barely living within their means; they would have to export practically all of their production in period 2.

3

We have that $CA_1 = -0.1(120) = -12$.
Then, $B^*_1 = CA_1 + B^*_0 = -12 - 100 = -112$, and $B^*_2 = 0 \implies CA_2 = 112$. Then, the needed trade balance would be

$$TB_2 = CA_2 - rB^*_1 = 112 + 11.2 = 123.2 > GDP$$

so they are living beyond their means.

Problem 3

1

We care about the domain $C_1, C_2 > 0$. Then, both partial derivatives exist and are positive, with $\frac{\partial U}{\partial C_i} = C_i^{-2}$ and both partial second derivatives are also extant and negative, with $\frac{\partial^2 U}{\partial C_i^2} = -C_i^{-3}$ $(i = 0, 1)$.

2

We have that the optimality condition is

$$U'(C_1) + \beta(1 + r_1)U'((1 + r_1)(\overline{Y} - C_1)) = C_1^{-2} - (1 + r_1)^{-1}(\overline{Y} - C_1)^{-2} = 0$$

Solving, we get that the optimal consumption is

$$C_1 = \overline{Y}\left(\frac{1 + r_1 - \sqrt{1 + r_1}}{r_1}\right), C_2 = \overline{Y}(1 + r_1)\left(\frac{\sqrt{1 + r_1} - 1}{r_1}\right)$$

Abbreviating $\sqrt{1 + r_1}$ to ρ, we get that

$$C_1 = \overline{Y}\left(\frac{\rho}{\rho + 1}\right), C_2 = \overline{Y}\left(\frac{\rho^2}{\rho + 1}\right)$$

3

$$\Delta C_1 = \frac{\rho}{\rho + 1}\Delta\overline{Y} = \frac{\rho}{\rho + 1}\Delta Q_1$$
$$\Delta TB_1 = \Delta Q_1 - \Delta C_1 = \Delta Q_1 - \left(\frac{\rho}{\rho + 1}\right)\Delta Q_1 = \frac{1}{\rho + 1}\Delta Q_1$$
$$\Delta CA_1 = \Delta TB_1 + \Delta(r_0 B_0) = \Delta TB_1 = \frac{1}{\rho + 1}\Delta Q_1$$

4

Putting $\Delta Q_1 = \Delta Q_2 = \Delta Q$,

$$\Delta C_1 = \frac{\rho}{\rho + 1}\Delta\overline{Y} = \left(\frac{\rho}{\rho + 1}\right)\left(\frac{2 + r_1}{1 + r_1}\right)\Delta Q = \frac{\rho^2 + 1}{\rho^2 + \rho}\Delta Q$$
$$\Delta TB_1 = \Delta Q_1 - \Delta C_1 = \Delta Q_1 - \left(\frac{\rho^2 + 1}{\rho^2 + \rho}\right)\Delta Q_i = \frac{\rho - 1}{\rho^2 + \rho}\Delta Q_1$$
$$\Delta CA_1 = \Delta TB_1 + \Delta(r_0 B_0) = \Delta TB_1 = \frac{\rho - 1}{\rho^2 + \rho}\Delta Q_1$$

5

Note that for realistic values of r_1, $\rho = \sqrt{1 + r_1} \approx 1$, such that changes look a lot like they do with logarithmic preferences. We get the same conclusions that temporary shocks to endowment in period one yields nontrivial changes in consumption funded by either deterioration or improvement in the trade balance; in either set of preferences, this fall in consumption and corresponding increase in the trade balance is about half of the shock in magnitude.

For permanent shocks, we get that consumption eats almost all of the shock, just as with logarithmic preferences.