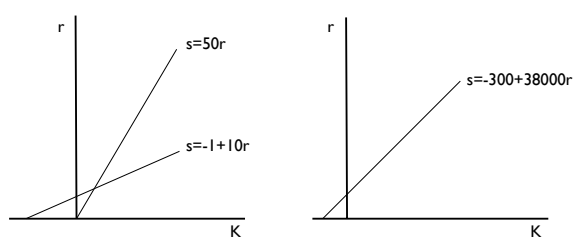
ECON 110, Professor Hogendorn

Problem Set 6 Answers

1. Assuming that you receive your first payment right away, the present value is
$$PV = 2 + \frac{2}{1.05} + \frac{2}{1.05^2} + \frac{2}{1.05^3} + \frac{2}{1.05^4}$$
This is equal to just over \$9 million today.

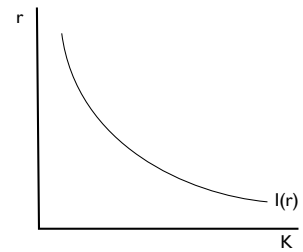
2. *SmallCountry_a.*

   (a) Aggregate saving is
$$S(r) = 700 \cdot 50r + 300(-1 + 10r) = -300 + 38,000 \cdot r$$
   When the interest rate is 3%, the savings of the two types and the aggregate are: 1.5, -0.7, 840. When the interest rate is 11%, these change to: 5.5, 0.1, 3880.



   At the low interest rate, 30% of households borrow and 70% save. There is more than enough saving to fund the borrowing, so aggregate saving is positive. When the interest rate rises, the savers save more, and the borrowers find it more expensive to borrow and actually switch over to saving. The aggregate saving obviously rises.

   (b) $I(r) = 100 I_F(r) = 1,000/r$.



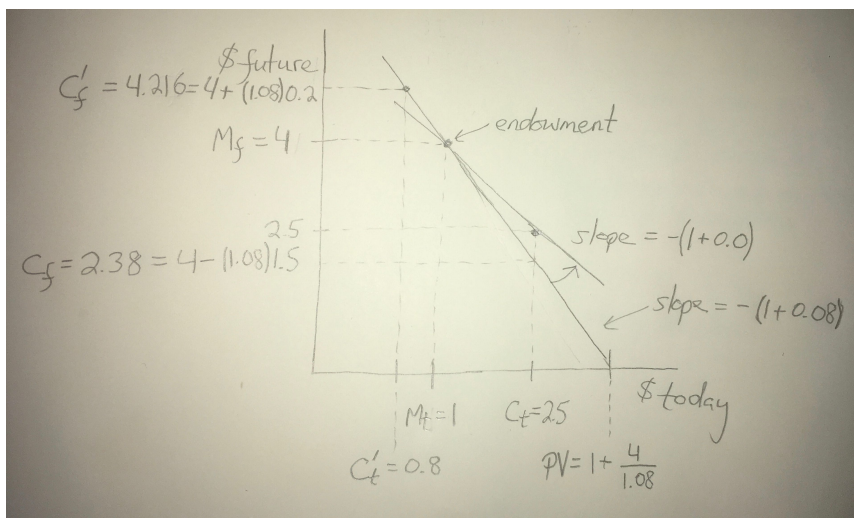
(c) Setting aggregate saving equal to aggregate investment gives:

$$-300 + 38,000 \cdot r = 1,000/r \Rightarrow 38,000 \cdot r^2 - 300r - 1,000 = 0$$

The root of this is $r = 16.6\%$.

3. *Enough_a.*

(a) The budget line diagram looks like this:



(b) Since you can borrow at a real interest rate of 8%, the present value of the endowment is

$$PV = 1 + \frac{4}{1.08} = 4.7$$

(c) It turns out that you can't do this. If you borrow 1.5, then you will have to pay it back with 8% real interest, so your maximum future consumption will be $C_f = 4 - (1.08)1.5 = 2.38$ which is less than 2.5. Thus the point (2.5,2.5) is above the budget line.

(d) You would need to be able to borrow more cheaply, so the interest rate would have to fall, pivoting the budget line flatter. To get to the (2.5,2.5) point, you actually have to be able to borrow for free, since you are trying to consume all five units of endowment and any interest cost would prevent you from doing that.

(e) Saving in the first half of your life means moving to the left of M_t, and the returns from the saving will allow you to move above M_f in the future. With returns of 8%, the future value will be $C_f{}' = 4 + (1.08)0.2 = 4.216$.