Econ 134 - Financial Economics

Nehring January 22, 2008

Problem Set # 2

To receive credit, your homework has to be handed in on Tuesday, Januray 29, in class. Two out of the three problems will be graded for serious effort, for a maximum of 60 effort points. Numbers in parentheses denote the maximal effort score for each question. In addition, you can also receive points on the correctness of your answers to parts 1i), 2iii), 3i) for an additional 10 points each (max. 20 in total). Thus the maximal total score is 80=60+20 points. Again, make sure to hand in every single problem set; otherwise, your homework score will suffer substantially.

1. (30) CF, ch. 4

i) problem 5

ii) problem 7

iii) problem 21.

2. (30) Macadamia nut trees take a long time to bear fruit. Consider thus the investment decision to plant a macadamia nut tree. This involves the following sequence of cash flows: at date 0: \$ –150 (for planting), at dates 1 through 8: \$ –10 (for tending + opportunity cost of land), at dates 9 through 20: \$ 50p (from selling the nuts), with p denoting the market price for one pound of macadamia nuts which is constant over time; for simplicity, I have assumed away any cost component in the cash flows from date 9 onward; the tree dies after 20 years.

Answer each of the following questions for the interest rates r=0% and r=4%.

i) What is the NPV of planting one tree if p=0.60 ?

ii) Assume now that the macadamia nut industry is perfectly competitive and in equilibrium; this means that the NPV of planting a tree must be zero (why?). Based on your answers to part i), must the stationary equilibrium price for macadamia nuts be greater, less or equal to p = 0.60?

iii) Compute the equilibrium price. (*Hint: this involves solving a linear equation*).

iv) Now assume that macadamia nut trees bear fruit for 120 years instead of a measly 12, everything else being unchanged. What will the equilibrium price be now in each case?

v) If the interest rate is 0%, the equilibrium price in iv) equals one tenth of the equilibrium price in iii), since macadamia nut trees are now ten times as productive.

If the interest rate is 4%, however, the equilibrium price in iv) is *more* than one tenth of the equilibrium price in iii) although macadamia nut trees are again ten times as productive. Why?

3. (30) You are $ 10,000 in debt, and you want to get rid of it by paying back a constant amount each year for the next ten years, starting 1 year from now. The interest rate on the debt is 14% p.a. .

i) How much do you need to pay each year (*Hint one: what is the relevant annuity factor*? *Hint two: again, this involves solving a linear equation).*

ii) How much will you owe right after your *first* payment?

iii) How much will you owe right after your *fifth* payment? (*Hint: consider the value of what you still need to pay!).* Before trying to do a calculation, reason verbally whether you should expect the amount to be higher or lower than $ 5,000, and write your reasoning down.

iv) Suppose you decide to pay back $ 1,600 each year. How long will it take to cancel your debt? [*Hint: to solve for t, you will either need logarithms or to apply the doubling approximation presented in class, i.e., for* $r \leq 0.2$*:* $(1+r)^t = 2$ *if and only if (approx.)* $t = 0.7/r$.]

v) Compare the straight, undiscounted sum of your payments in iv) to the undiscounted sum in i); which is higher, and why?