Course in Macroeconomics and Global Economics
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Practice 9

Exercise 1

Imagine there is a bond that pays you a constant amount, z, every year and forever. The present value of an infinite stream of constant euro payments, €z, when the nominal interest rate, i, is constant is $\frac{€z}{i}$. It is also a good approximation for the present discounted value of a stream of constant payments over long but not infinite periods, as long as i is constant. Let's examine how close the approximation is.

1. Suppose $i = 10\%$ and €z=100. What is the present value of such a bond?
2. If $i = 10\%$, what is the present discounted value of a bond that pays €z over the next 10 years? 20 years? 30 years? 60 years?
3. Repeat the calculations in 1. and 2. for $i = 2\%$ and $i = 5\%$.

Exercise 2

A consumer has non-human wealth equal to €100,000. Her income is €40,000 this year, and she expects it to rise by 5% in real terms over the next two years, after which she will retire. The real interest rate is equal to 0% and is expected to remain 0% in the future. Labor income is taxed at a rate of 25%.

1. What is this consumer's human wealth?
2. What is her total wealth?
3. If she expects to live for seven years after retiring, and wants her consumption to remain the same (in real terms) every year from now on, how much can she consume this year?
4. If she received a bonus of €20,000 in the current year, while leaving all future incomes as previously stated, by how much could she increase her consumption now and in the future?

5. Suppose now that at retirement, social security will start paying benefits equal to 60% of the salary earned during the last working year. Also, suppose this benefit is not subject to taxation. How much can she consume this year, still maintaining constant consumption over her lifetime?

Exercise 3

A manufacturer is considering whether to buy a new machine that costs €100,000. The machine will depreciate by 8% every year and will generate profits equal to €18,000 per year, starting from next year. Determine whether the manufactures should undertake the investment if the real interest rate is assumed to remain constant at each rate in 1. through 3..

1. 5%.
2. 10%.
3. 15%.