Exercise 2

Present Value of Social Security Benefits and Taxes A

Edward C. Prescott

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A question is how much value a 22 year old college graduate, living and working in the United States, will get back relative to the value of that person's contributions. This exercise is designed to show you how to answer this question.

The problem is to compare the value of the involuntary social security contributions with the value of the benefit payments. Assume that the U.S. Social Security system will honor its promises. Assume in addition the following in your calculations:

Assumption 1: Current year is t = 0.

Assumption 2: You will live 60 more years. You will work for45 years; and then retire and collect social security benefits for the next 15 years.

Assumption 3: Year t social security taxes are 12.4 percent of labor income up to $85,000 \times 1.02^t$. This assumes that real per worker labor income will grow at 2 percent per year. This is what has happened throughout the twentieth century in the United States.

Assumption 4: Let w_t denote year t annual labor income in current dollars (t=0 corresponds to year 2003). Annual labor income is $w_t = a_t \times 1.02^t \times 32,000$. The age-experience factor a_t increases linearly from 1.0 at t = 0 to 1.5 at t = 20; $a_t = 1.5$ for t = 20, ... , 35; and then a_t declines linearly to 1.0 at t = 45.

Assumption 5: The real interest rate is 4 percent now and in the future. Use this number in your present value calculations. Values should be in terms of current prices, so $p_0 = 1$. Note $p_t = 1.04^{-t}$.

Part 1: Determine the social security benefits that this person will receive. The web site has the information. The person in question will be 62 in the year 2044. The adjustment factor is 1.0 in year 2043 and in 2042. Then it increases by factor 1.02 each year as you go back in time. This gives you the adjustment factors that you will need in the calculations. Real benefit levels are constant subsequent to retirement; that is they are index to the price level.

Part 2: Determine the present value of benefits and the present value of taxes. Is social security a good deal for this person?

Part 3: Suppose that these taxes were put in a retirement account where they earned a 4 percent real return. How large would the retirement benefits be? (harder question).

Include your name, student ID number, course number, and date at the top. You are limited to two pages for the answers. All that I want to see is the numerical results and the algebraic formulas used to compute them. Points will be taken off for those who do not follow these instructions.