

Problem Set 5: Economics and Religion Models

1. Suppose that an individual's utility was $\ln c_1 + \ln c_2 + a$, where after life consumption a is a function of religious attendance in each period of life: $a = \ln r_1 + \ln r_2$. The person's budget constraint is as in class: $pc_1 + s_1 = w_1(1 - r_1)$ for period 1 and $pc_2 + w_2r_2 = w_2 + (1 + i)s_1$ for period 1.
 - A. Combine the two budget constraints as in class
 - B. Set up the Lagrangian
 - C. Find solutions for consumption and religion as functions of wages, the interest rate, and the price of consumption.
 - D. The above problem is for 2 periods. Now suppose that this individual lives for 1,033 years. Utility is $a + \sum_{t=1}^{t=1,033} \ln c_t$, so it is just like the utility function before but now there are more periods. And after life consumption is similar to before too: $a = \sum_{t=1}^{t=1,033} \ln r_t$. As before, the individual can save money from one period to the next. Let's assume that $w_t = 1$ each period, that $p = 1$ each period, and that i is zero. Will the attendance and consumption choices be the same in each period? Solve for what consumption and attendance will be in any given period t .

2. Suppose that an individual got utility from beer B and donations to church D . Two people go to church, and D is the sum of their donations: $D = d_1 + d_2$. Person 1's utility function is:

$$U = 2B^{1/2} + 2(d_1 + d_2)^{1/2}$$

and their budget constraint is $pB + d_1 = I$

- A. Set up person 1's Lagrangian
- B. Taking person 2's donation as given, solve for d_1 and B . Your answers will be a function of I , p , and d_2 . If person 2 donates more to the church, does person 1 donate more? Do they drink more beer?
- C. Suppose that in the Nash Equilibrium each person donates the same amount, and that for each person prices and income are 1. Solve for each person's donations and beer.
- D. Plug your answer from part C into the utility function (use a calculator) and see what each person's utility is.
- E. Now let's pretend we could order people in this church around and they had to obey us. Let's see if we can do better than what we got for parts C and D. Let's maximize the "added up" utility functions:

$$2B_1^{1/2} + 2(d_1 + d_2)^{1/2} + 2B_2^{1/2} + 2(d_1 + d_2)^{1/2}$$

The first two terms are person 1's utility and the next two terms are person 2's utility. The budget constraint is $p(B_1 + B_2) + d_1 + d_2 = I + I$. But to make life easy let's assume $I = 1$ and $p = 1$ too. Solve for d_1 , d_2 , B_1 , and B_2 . Plug in and verify that people are better off here than they were in part D. What is going on here?

3. Suppose somebody is thinking of joining a strict church. They consume beer and donate money to the church. The point A below shows the outcome they would choose with no church. The dashed budget line shows the budget line they would face if they joined the church.

Here is the question: what sort of indifference curve passing through point A would make a person more likely to join the church—would it be a “straight” sort of indifference curve or more of a “right angle?” Iannaccone’s theory suggests that strict churches should attract people who either (a) view drinking and donations as activities that substitute well for each other or (b) activities that don’t substitute well for each other. Which do you think he finds? Is this intuitive?

