Economics 106

Decision Making

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**PROBLEM SET # 8 – ANSWER KEY**

**1.** i) If Karen's wealth uses her current wealth as the Status Quo, her expected utility at chance node 3 (ie. given that Karen wins the law suit) is

$0.25 \times 185000 + 0.25 \times 310000 + 0.25 \times 415000 + 0.25 \times 580000 = 372500.$

Hence Karen's expected utility at chance node 2 (ie. given that she goes to court) is

$0.7 \times 372500 + 0.3 \times (-60000) = 2\,427\,50$, which exceeds her utility from settling which is equal to 210000. Hence she would go to court.

ii) By contrast, if Karen takes her settlement outcome of 210000 as Status Quo, her expected utility at chance node 3 (ie. given that Karen wins the law suit) is

$0.25 \times (-50000) + 0.25 \times 100000 + 0.25 \times 205000 + 0.25 \times 370000 = 1\,562\,50$

Hence Karen's expected utility at chance node 2 (ie. given that she goes to court) is

$0.7 \times 1\,562\,50 + 0.3 \times (-480000) = -34625$, which is less than her utility from settling which is now equal to 0. Hence she would settle.

iii) With the low SQ in i), almost all outcomes are gains, so Karen decides almost like a risk-neutral person would. By contrast, with the higher SQ in ii), a low award is now a small loss, and losing the trial is a very big loss. Since Karen is loss-averse, she thus requires a substantial risk-premium for going to court. The sure prospect of $210000 is accordingly more attractive compared to i). Since Karen can get the $210000 for sure, this seems to be the more common-sensical choice of a status quo point.

**2.** i) Dick's expected utility is

$$0.4 \times 200 + 0.6 \times 1.5 \times (-100) = -10.$$

Since this is less than $u(0) = 0$, Dick will not take the gamble.

ii) The combined gamble results in \$+400 with probability $0.4 \times 0.4 = 0.16$, \$+100 with probability $0.4 \times 0.6 + 0.6 \times 0.4 = 0.48$, and \$-200 with probability $0.6 \times 0.6 = 0.36$. Dick's expected utility is therefore

$$0.16 \times 400 + 0.48 \times 100 + 0.36 \times 1.5 \times (-200) = 4.$$

Since $4 > 0$, Dick would take the combined gamble.

iii) If a loss-averse investor evaluates risky investments using a short time horizon ("myopically"), he may reject investments that would be attractive if evaluated using a longer time horizon. Thus a more frequent evaluation of stocks diminishes the investor's willingness to hold stocks. If the typical investor acts like this, this leads to a high risk-premium on stocks.

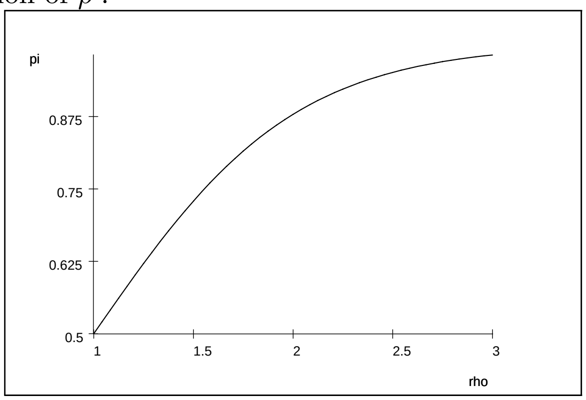
**4. (40)** i) You would be indifferent.

ii) Hence the indifferent probability is 50%.

iii) Now you gain less by being born 100 years later (and richer) relative to being born 100 years earlier; hence you would now clearly prefer the draw `2000`.

iv) You need an 87.9% probability (i.e. more than 7:1 odds) to be indifferent. Thus perople in 2100 would not be that much better off than we are today.

The indifference probability as function of the growth rate $g$ and the "degree of relative risk-aversion" $\rho$ is given by $\frac{1-(1+g)^{-100(1-\rho)}}{(1+g)^{100(1-\rho)}-(1+g)^{-100(1-\rho)}}$; here is a plot of the indifference probability "pi" as a function of $\rho$ :




v) The CME of the \$-lottery is 0.27, that is $\boxed{\$9386}$; this GDP per capita is 96% higher than that of 1900.

Under the constant 2%-growth assumption, this CME would have been reached in $\boxed{1934}$! (As a matter of historical fact, this value was reached in 1942, since GDP stagnated in the 1930s; for more info, see for example http://www.eh.net/hmit/gdp/ ).

To figure this out, you need solve the equation

$$\frac{1}{1.02^{100}}1.02^t = 0.27.$$

Taking natural logs, this becomes

$$(t-100)\log 1.02 = \log 0.27.$$

Since $\log 0.27 = -1.3093$ and $\log 1.02 = 0.0198$, this becomes

$$t - 100 = \frac{-1.3093}{0.0198} \approx -66;$$

that is, the indifference date is 66 years ago, i.e. 1934.

Here is a plot of the indifference date as a function of rho: