Discount rate (lottery payout) choice model:

Let $Y^{(\lambda)} = \frac{Y^{\lambda} - 1}{\lambda}$, a Box-Cox transformation that allows for risk aversion;

let $\delta = \frac{1}{(1+r)}$, the discount factor with subjective discount rate r

$A_{r*}^{T_i} = \frac{(r*)L_i}{1 - \left(\frac{1}{1+r*}\right)^{T_i}}$, the annual equivalent with a deposit, at rate $r*$, over T_i years, of amount L_i at time t=0.

We assume in the deterministic case that utility in the current period is given by $V = \beta Y^{(\lambda)}$, and that the present value of utility experienced in future year t is $V = \delta^t \beta Y^{(\lambda)}$. Expected utility is the probability-weighted average of utilities at the different possible income levels. If $\lambda \neq 1$, then this expected utility will differ from the utility level associated with the expected income received with certainty.

We assume that the current period is time 0, followed by periods 1 through T. If the individual elects to take the lump sum now in the lottery choice, his discounted expected utility will reflect income augmented by the annual earnings on a term deposit of this size in each of years 1 through T:

$$V_i^1 = \underbrace{\beta \left[Y_{i0}\right]^{(\lambda)}}_{\text{period 0}} + \underbrace{\sum_{t=1}^{T_i} \delta^t \beta \left[Y_{it} + A_{r*}^{T_i}\right]^{(\lambda)}}_{\text{periods 1 to T}} + \eta_i^w \tag{1.1}$$

If the individual elects instead to take the series of T_i annual payments, x_i, every year starting now, his income over the identical periods will be as follows. Note that income in year T_i will consist only of earned income that year, since there will be no payout in the final year:

$$V_i^0 = \underbrace{\sum_{t=0}^{T_i - 1} \delta^t \beta \left[Y_{it} + x_i\right]^{(\lambda)}}_{\text{periods 0 to T-1}} + \underbrace{\delta^{T_i} \beta \left[Y_{it}\right]^{(\lambda)}}_{\text{period T}} \tag{1.2}$$

Risky investment choice scenarios:

There are three such choice scenarios, but each can be modeled the same way. Let $Y^{(\lambda)}$ and δ continue to be defined as above. But now let $A_{r*}^{T_i}$ denote the equivalent annualized value of the small inheritance amount, extending forward over the same time period as the certain and risky investment options, T_i:

$$A_{r*}^{T_i} = \frac{(r*)IN_i}{1-\left(\frac{1}{1+r*}\right)^{T_i}}$$

where we use the same deposit rate $r*$ to calculate this annualized amount. For the certain investment, indirect utility will be given by:

$$V_i^1 = \underbrace{\left[\sum_{t=0}^{T_i-1} \delta^t \beta Y_{it}^{(\lambda)}\right]}_{\text{periods 0 to T-1}} + \underbrace{\delta^{T_i} \beta \left[Y_{iT_i} + CP_i\right]^{(\lambda)}}_{\text{period T}} + \eta_i^{r1} \tag{1.3}$$

For the risky investment, indirect utility is measured by discounted expected utility:

$$V_i^2 = \underbrace{\left[\sum_{t=0}^{T_i-1} \delta^t \beta Y_{it}^{(\lambda)}\right]}_{\text{periods 0 to T-1}} + \underbrace{\delta^{T_i} \left\{0.5\beta\left[Y_{iT_i} + RPL_i\right]^{(\lambda)} + 0.5\beta\left[Y_{iT_i} + RPH_i\right]^{(\lambda)}\right\}}_{\text{period T}} + \eta_i^{r2} \tag{1.4}$$

For neither investment, just keeping the inheritance and using for something else now, we assume that utility derives from the annualized value at deposit rates in the market:

$$V_i^3 = \underbrace{\beta\left[Y_{i0}\right]^{(\lambda)}}_{\text{period 0}} + \underbrace{\sum_{t=1}^{T_i} \delta^t \beta \left[Y_{iT_i} + A_{r*}^{T_i}\right]^{(\lambda)}}_{\text{periods 1 to T}} + \eta_i^{r3} \tag{1.5}$$

Empirically, there remains the matter of approximating the individual's expected income from now until T_i. Fortunately, our survey of mostly college students includes a questions about the individual's "household" income at the time the survey is taken. It also elicits the individual's expected future income bracket at a series of four fixed points in the future: five years out, ten years, twenty years, and 30 years. Respondents were permitted to check a single bracket, or to indicate a range of brackets. While acknowledging that the results are only approximate, we take either the midpoint of the single prediction or the average of the midpoints when a range of brackets was indicated. To fill in expected future income for each year in the future, we interpolate linearly between current household income, and income in each future year, as needed. For years beyond thirty years into the future, we hold expected income constant at the level indicated for thirty years. Note that for many respondents, current household income is greater than that expected income five years out (reflecting membership in a parental household, as opposed to an independent household, post-graduation).[1]

[1] For a small number of respondents, among whom the maximum age was 50, expected incomes of zero were reported in some future years. We exclude these individuals from the sample. Thus we condition these results on people who expect to live at least until age eighty. We drop those who predict zero-income because even without wage income, most people will have some form of retirement income.