1. Empirical Testing of the LCH

Suppose you are given the following data for a group of single men, aged 60 in year 1980 and 70 in year 1990:

1. wealth, income (including labor earnings and asset income) and consumer spending in 1980;

2. wealth, income (including asset income and pension income) and spending in 1990;

3. expectations, as of 1980, of the annual flow of pension income after retirement, where for convenience assume that there is no Social Security or other public pension available to everyone, but that employers may provide pensions to their retired workers.

Assume that pension coverage varies within your sample: some workers expect to receive no pension after retirement, others expect a small pension, others expect a larger pension, and some expect their pension income to be even higher than their earnings while working.

Assume that all of your sample men are working in 1980 but retired by 1990, and that all of your sample men are still alive as of 1990.

(a) Explain how you would use your data to test the permanent income hypothesis, and how if the permanent income hypothesis were rejected one could distinguish myopia from liquidity constraints.

(b) Suppose someone argues that people have different discount rates and that people who discount the future heavily will tend to select into jobs that have high earnings while working but low or no
pension coverage after retirement. Assuming that this argument is true, explain how it could lead you to reject the permanent income hypothesis in part (a) even if the permanent income hypothesis is true. (Hint: think about omitted variables bias. If discount rates differ across individuals but we impose the same constant term across individuals in our consumption growth regression, then differences in discount rates will be an omitted variable and part of the error term. What happens in an OLS regression if a right-hand-side variable is correlated with the error term?)

(c) Now suppose you have data on income and spending for this group of single men in 1970. Explain intuitively how you could use this data to test the argument laid out in part (b), assuming that discount rates don’t change for individuals over time. (Hint: can we use Δc from 1970 to 1980 to control for differences in discount rates? Why or why not?)

2. Precautionary Savings

**Definition 1** if \( X \) is lognormal, then the mean of \( X \) satisfies \( \mathbb{E}(X) = \exp(\mu + \frac{1}{2}\sigma^2) \), where \( (\mu, \sigma^2) \) are the mean and the variance of \( \log(X) \).

Now the problem. Assume that an individual faces the following two-period problem, with zero discount and interest rates:

\[
Max \ \{ u(C_1) + \mathbb{E}_1[u(C_2)] \} \\
\text{s.t.} \\
C_2 = (W_1 - C_1) + W_2
\]

Assume that \( W_1 \) is know at time 1, while \( W_2 \) is normally distributed with mean \( \mu_W \) and variance \( \sigma^2_W \). Assume that utility is

\[
U(C) = -\frac{1}{\alpha} \exp(-\alpha C)
\]

Derive a closed-form solution for first-period consumption and first-period precautionary saving. How does the amount of precautionary saving vary with the variance of \( W_2 \)?