Homework 4
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1 Data Assignment

Following Huggett, Ventura, and Yaron (2011), to estimate age profiles for mean earnings and measures of earnings dispersion and skewness, we imposed the following sample selection criteria on the PSID dataset:

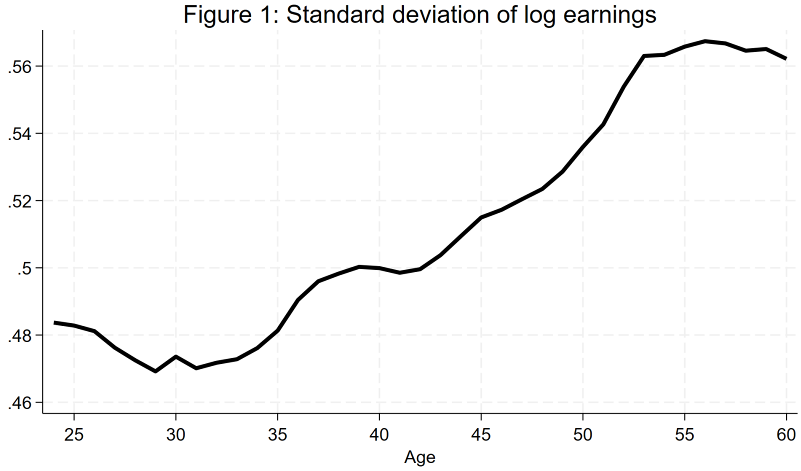
1. Observations must be between years 1978 and 1997 of the PSID.
2. We drop all individuals from the SEO oversample.
3. We consider only male head of the households.
4. We consider only observations of individuals who are aged between 23 and 60.
5. For males over age 30, we require that they work between 520 and 5,820 hours per year and earn at least \$1,500 (in 1968 prices) a year.
6. For males age 30 and below, we require that they work between 260 and 5,820 hours per year and earn at least \$1,000 (in 1968 prices).

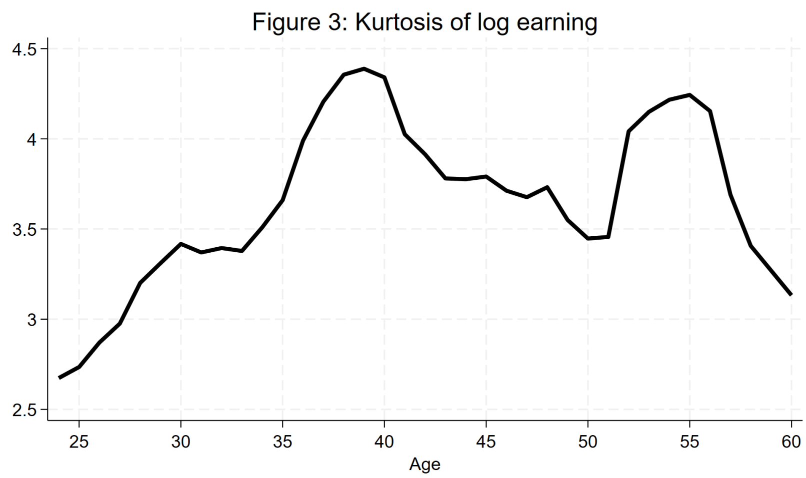
To calculate earnings statistics at a specific age and year, we employ a five-year age bin. We estimate the following specification:

$$stat_{j,t} = \beta_j^{stat} + \gamma_j^{stat} + \epsilon_{j,t}^{stat}$$

In the figures we report the coefficients β_j^{stat} as a function of j. Each profile is normalized to run through the mean value of each statistic across panel years at age 40.

Figure 1: Standard deviation of log earnings





2 Model Overview

Consider a simplified form of the model from Huggett, Ventura, and Yaron [2011]. There are overlapping generations of households who live and for T periods (i..e, there is no retirement). Agents are heterogeneous in the human capital h, and assets k (there is a common level of ability). In each period, agents make a consumption savings decision and a decision about how much time to invest in their human capital, which follows a Ben-Porath structure.

(a) Plot the average path of earnings in the model as well as the standard deviation, skewness and kurtosis of earnings by age. How do these graphs compare data estimates you created in Part (1) and those presented in Huggett, Ventura, and Yaron [2011].

To solve the model we used a grid of size $(nh, nk, ns, nz) = (1000, 300, 20, 5)$. The next four Figures show the mean, standard deviation, skewness and kurtosis of earnings by age. Notice that mean earnings increase quickly between ages 25 and 30, and then stabilize near 7 until age 50. In the PSID the standard deviation and skewness increase with age, in the model standard deviation increases and stabilizes, wile skewness decreases from age 30 to age 45. So the dynamics are quite different. The evolution of Kurtosis in the PSID and the model also differ.

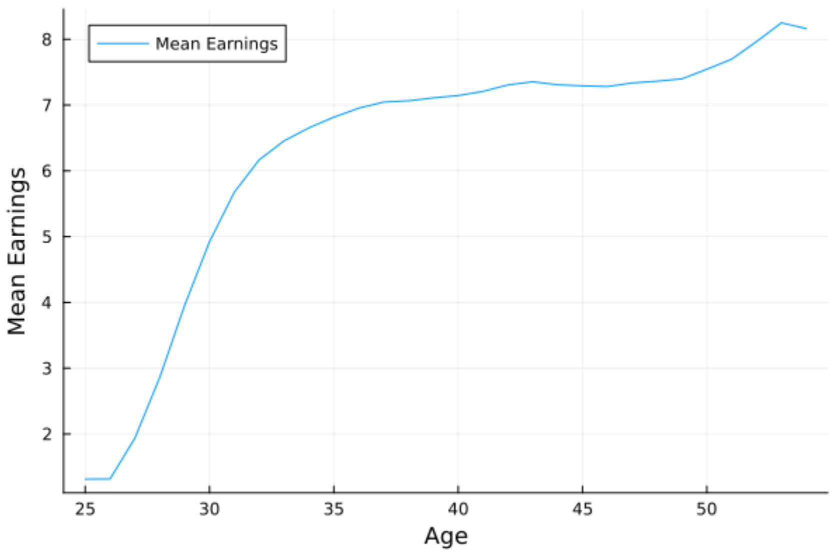


Figure 1: **Mean Earnings**

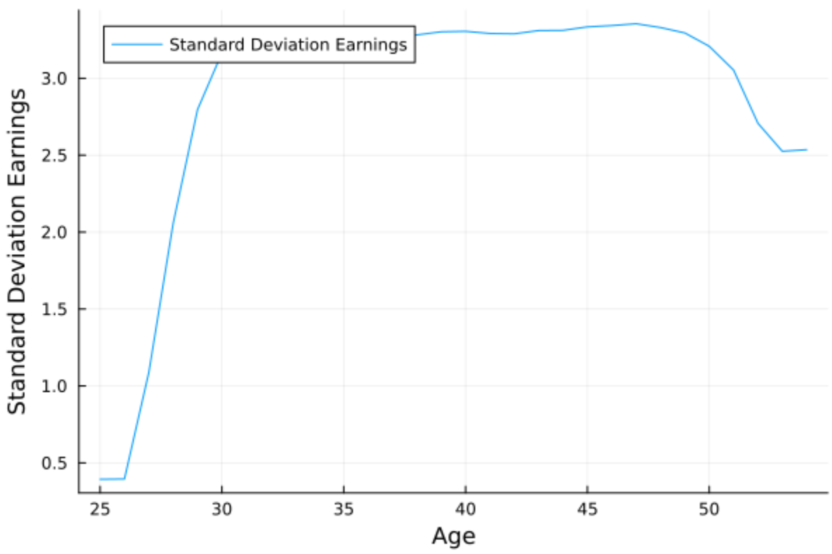


Figure 2: **Standard Deviation of Earnings**

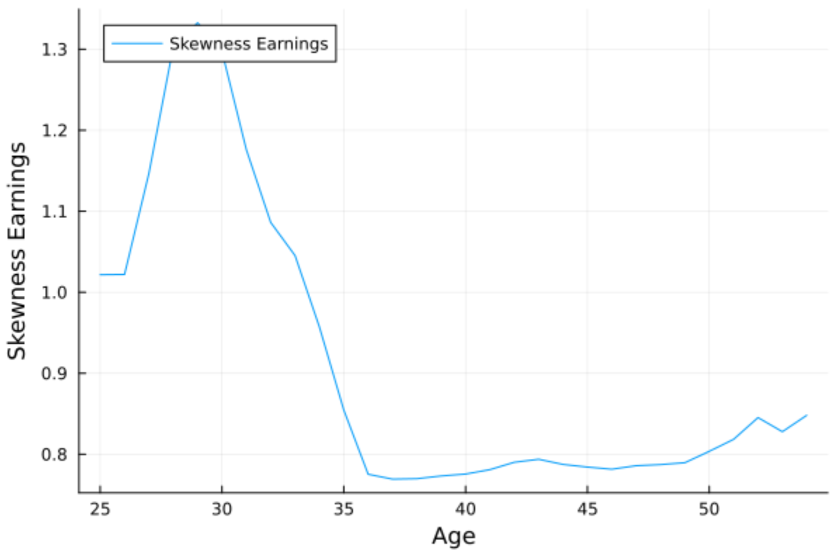


Figure 3: **Skewness of Earnings**

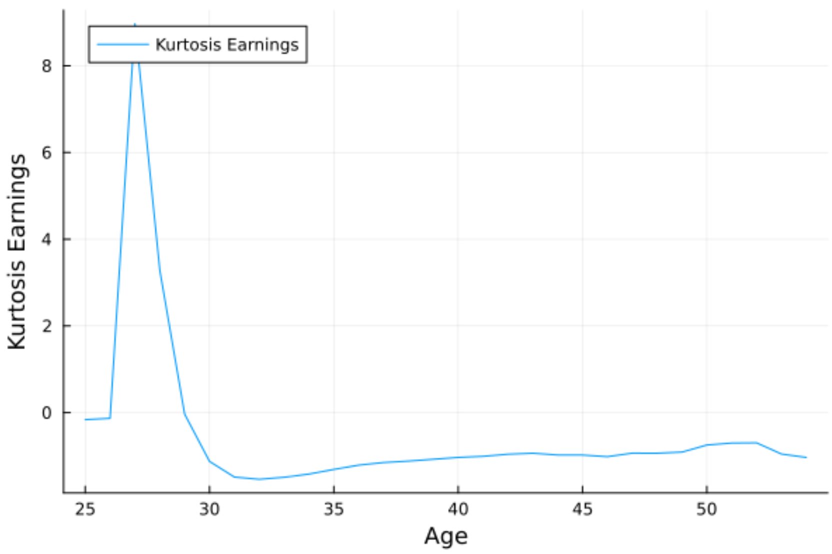


Figure 4: **Kurtosis of Earnings**

(b) Plot the policy function for investing in human capital as a function a function of (1) assets and (2) human capital for workers of different ages.

The following Figures show the investing in human capital policy functions as a function of assets and human capital, respectively. For Figure 5 we fix the level of human capital to the simulation's percentile 15 which is $h = 3.65$. Notice that individuals with similar assets (and human capital) make intensive investments for ages 25-45.

In Figure 6 we fix the level of assets to the simulation's percentile 50 which is $k = 6.35$. The policy functions are noisier than the previous ones. Investing in human capital is a decreasing function of human capital for this value of assets. Notice again that investing is quite similar for individuals with age 25-45. However, for individuals with age 51 investing declines since the lifetime horizon is getting shorter and the benefits of human capital accumulation decline.

Figure 5: **Human Capital Policy function**

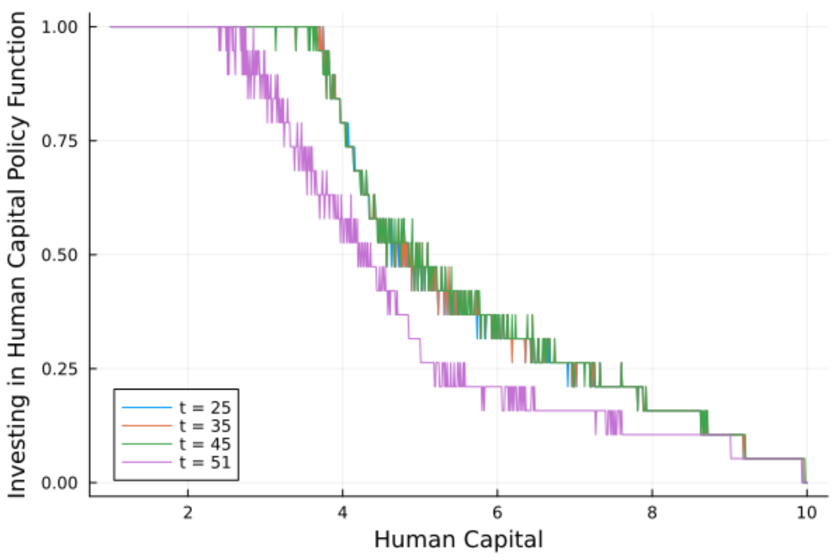


Figure 6: **Human Capital Policy function**

(c) How do these policy functions change if you increase the variance of shocks to human capital? Why do you think you see this pattern?

We solve again the model increasing the variance of the shocks to human capital from $\sigma^2 = 0.11$ to $\sigma^2 = 0.21$. We show the investing in human capital policy functions fixing the sames values as before of $h = 3.65$ and $k = 6.35$ even if they do not represent the previous percentile values. In Figure 7, investment in human capital is lower across all age groups compared to Figure 5, with the same levels of human capital and assets.

Since households preferences are CRRA, then human capital is riskier. This implies that investment will decline since households will prefer to save in a risk free asset.

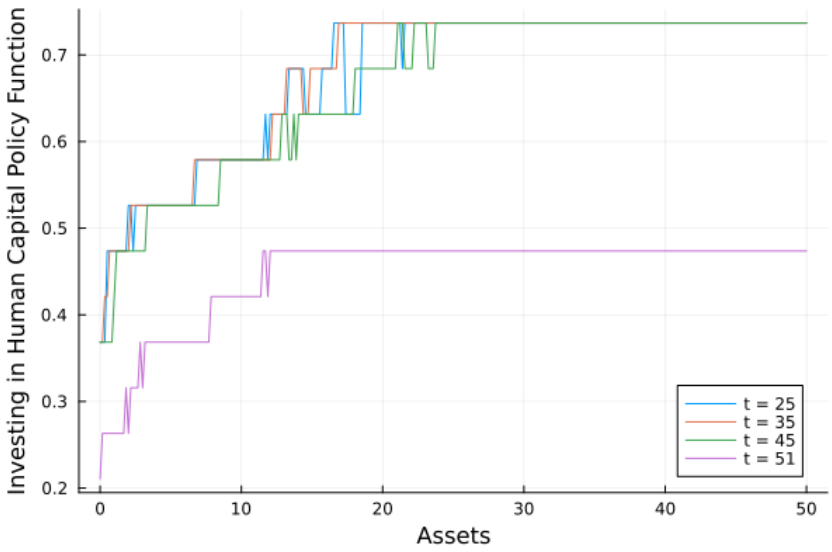


Figure 7: **Human Capital Policy function**

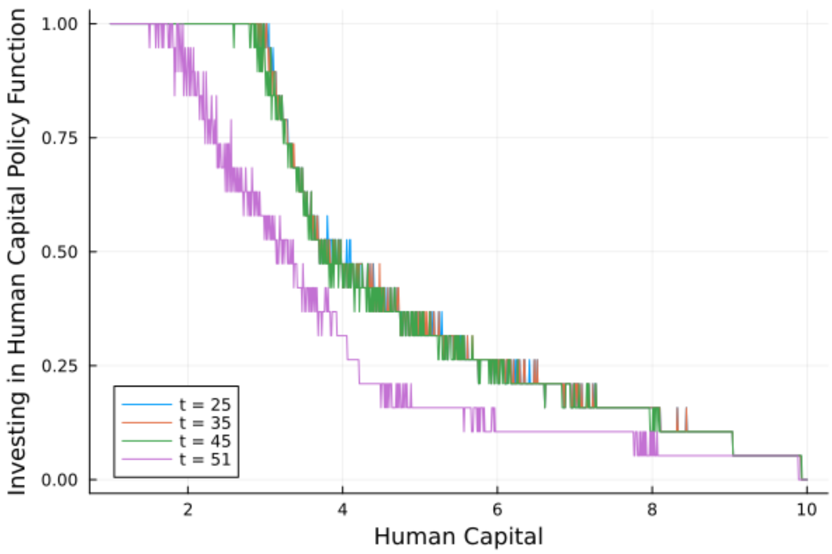


Figure 8: **Human Capital Policy function**

(d) Create a measure of lifetime earnings based upon Guvenen et al. [2017]. If you increase the initial dispersion of human capital, how does your measure of lifetime inequality change? How does the path of the standard deviation of earnings by age compare to your graph from part (a)?

Following Guvenen et al. [2017], we obtain a measure of lifetime earnings:

$$\bar{Y}^i = \frac{1}{30}\sum_{t=30}^{59} Y_t^i$$

We simulate the model twice using different initial distributions from which workers draw their initial human capital: $\mathcal{N}(2.0, 0.5)$ and $\mathcal{N}(2.0, 2.5)$. Notice that higher initial dispersion in human capital implies higher lifetime-earnings inequality.

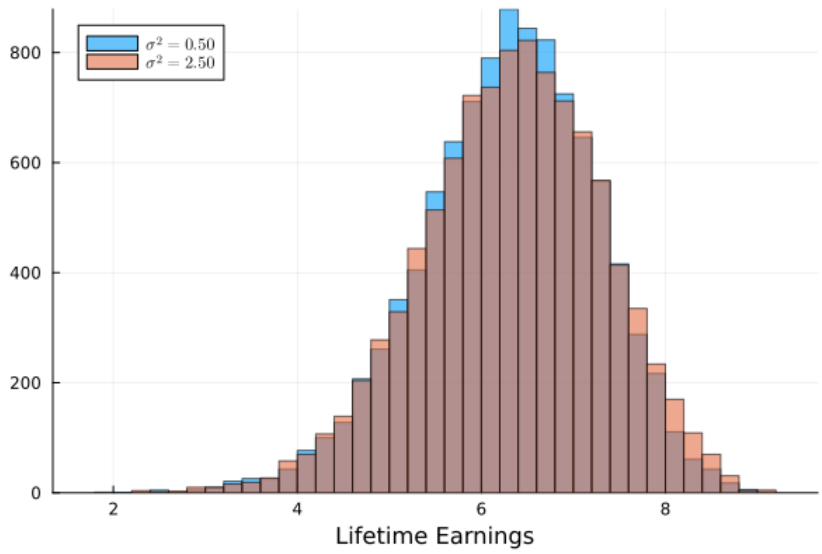


Figure 9: **Histogram of Lifetime Earnings Observations**

The path of the standard deviation of earnings by age increases between age 25 to 35, but after age 35 it is roughly the same as the path obtained before.

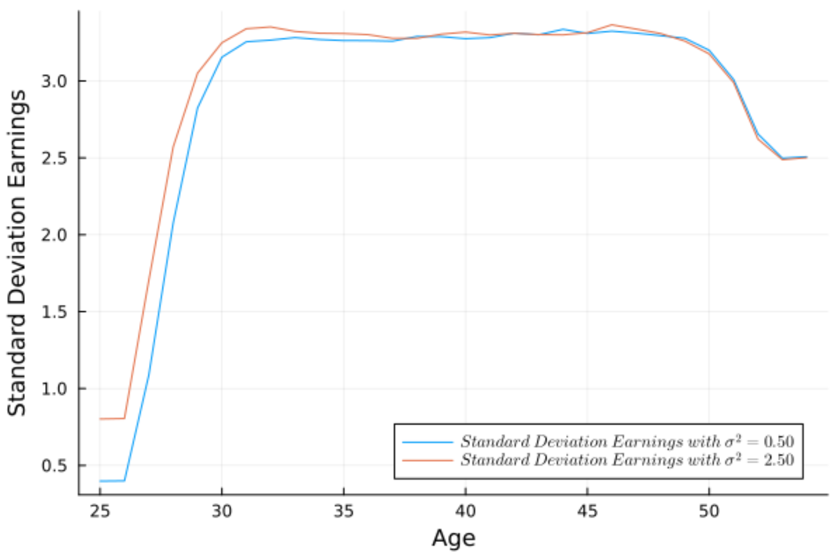


Figure 10: **Standard Deviation of Earnings**

References

Fatih Guvenen, Greg Kaplan, Jae Song, and Justin Weidner. Lifetime incomes in the united states over six decades. Technical report, National Bureau of Economic Research, 2017.

Mark Huggett, Gustavo Ventura, and Amir Yaron. Sources of lifetime inequality. American Economic Review, 101(7):2923–54, 2011.