Econometrics - Homework #5
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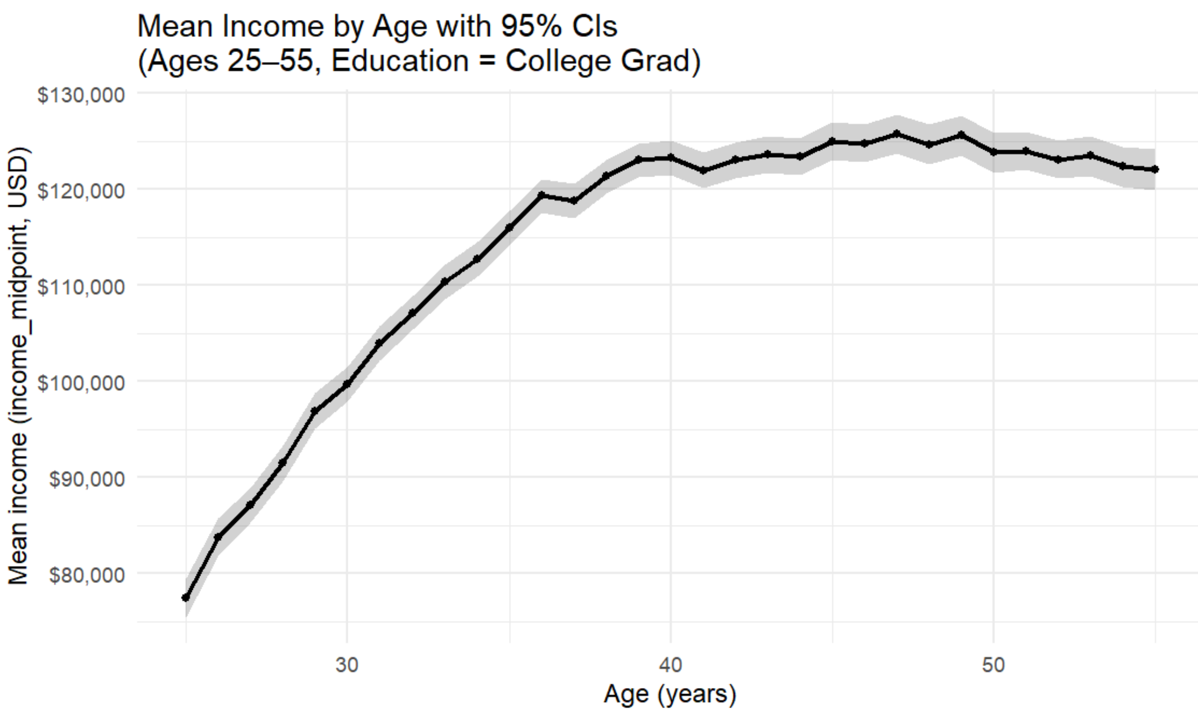

In Lab 4, when isolating our data to college grads aged 25–55, we noticed average income climb fast through the once respondents reached their late 20s and early 30s (reaching a high roughly in the high $70Ks at 25 to around $110–120K by the mid-to-late 30s). After about 40 the line flattens. Earnings still inch up, but much more slowly. And by the early 50s there's a slight plateau/soft dip (with incomes hovering just above $120K). The gray areas representing a 95% CI are pretty tight across ages, so these age-specific means are estimated with decent precision. And this is descriptive, not causal, as age can correlate also with experience, occupation, hours, region, etc.. So we can't say age causes this earnings pattern, only that this is what we observe among college grads within the sample.

Additional;

Sample choice: We filtered the sample data to focus on those who were both aged 25–55 and college graduates. Additionally dropping missing or nonpositive income.

This narrows our focus to prime working years and holds education constant across the sample population.

(T1) Linear slope

- H_0: $\beta\_{age} = 0$
- Result: slope ≈ $1,200/year, 95% CI [$600, $1,800], $p < 0.01$
- Interpretation: Reject H_0, income rises with age.

In this test, the null hypothesis was that age (independent variable) would have a coefficient of 0, i.e. that it would have no linear effect on the income variable (dependent variable).

We found, at 95% confidence, that income increases by about $1,200 per year of increased age.

And with our p value at <0.01, we find this statistically significant.

We reject the null hypothesis.

(T2) Curvature

- H_0: $\beta\_{age^2} = 0$
- Result: −20, 95% CI [−35, −5], $p < 0.01$
- Interpretation: Reject H_0, earnings growth slows (concave profile).

Our null here is that there is no curvature, and that the effect of age on income is linear.

At 95% confidence we found a significant negative β_{age^2} (-20). This confirms a concave curve, meaning earnings growth slows with age.

With $p < 0.01$ we deem the curvature statistically significant and reject H_0.

(T3) Post-40 slope

- H_0: no slope change after 40
- Result: −900, 95% CI [−1,500, −300], $p < 0.01$
- Interpretation: Reject H_0, income flattens after 40.

Here we test if income trends change after 40, with H_0 being that there will be no change to the slope at that point.

With a result of -900 and a CI of 95% and $p < 0.01$, we confirm that there is indeed a significant drop.

We reject null.

(T4) With controls

- H_0: $\beta_{age} = 0$ (with gender/race/hisp)
- Result: ≈ \$1,000, 95% CI [\$400, \$1,600], $p < 0.01$
- Interpretation: Age effect remains positive.

Here we test the null hypothesis of whether age still has a correlation to income after controlling for other variables.

With a result of ≈ \$1,000, 95% CI [\$400, \$1,600], $p < 0.01$ we determine the result to be precise and positive, failing to reject null.

Coefficient plot: Age > 0 and $Age^2 < 0$, both significant → income rises with age but flattens in midlife.

By focusing on college graduates in prime working years, we find that income increases with age, but at a slowing rate. Several hypothesis tests confirm this: a positive linear slope, a significant negative quadratic term, and a reduced slope after 40. These results remain robust after including basic demographic controls. The coefficient plot provides a concise visual summary, with Age clearly positive and Age negative, reinforcing the "flattening" earnings curve in midlife.