Assignment 1: Labor Supply and Children

The goal of this assignment is for you to *modify existing code* to answer policy relevant questions. All following questions should be answered using the model and code from lecture 5 on "The career costs of children". Several questions ask you to extend the baseline model. The idea is that you gradually build upon the same model such that all questions in the end can be answered with the same code but with some parameters restricted (i.e. try to avoid copying the same code many times!).

- **Structure:** Your project should consist of

  - A single self-contained pdf-file with all results. Include the model formulation and parameter values you used.

  - A single notebook (`.ipynb`) showing how the results in the pdf are produced.

  - Well-documented `.py` files.

- **Hand-in:** Upload a single zip-file on Absalon containing the elements above.

  - **Deadline:** March 15 2024.

  - **Exam:** Your answers will be part of your exam portfolio.
    You can incorporate feedback before handing in the final version.

Questions

1. What value of β_1 produces an event-study graph of working hours with something close to a drop in hours of 10pct around the time of birth as in Kleven, Landais and Søgaard (2019, Fig. 1B)?

2. Introduce in the model a spouse who contributes with income y_t every period. Let the income depend on age/period, such that $y_t = 0.1 + 0.01 \cdot t$. Write out the affected equations and implement it in Python. Compare and comment on the simulated behavior from this alternative model in relation to that of the baseline model above. Concretely, how does the Marshall elasticity change?
   [$y_t = 0 \forall t$ gives the baseline model.]

3. Introduce in the model a childcare cost of $\theta = 0.05$ in the presence of a child. You can think of this as a policy reform reducing the child care subsidy. Write out the affected equations and implement it in Python. Compare the simulated behavior from

this alternative model in relation to that of the baseline model above.

[$y_t = 0 \forall t$ and $\theta = 0$ gives the baseline model.]

4. Discuss how endogenous fertility adjustments could affect the impact of a child subsidy reform as the one above.

5. Imagine that whether a spouse is present or not is random and $p_s = 0.8$ is the likelihood that a spouse is present in a given period. Furthermore, imagine that a child can only arrive if a spouse is present. Formulate mathematically the recursive formulation of this model and implement it in Python. Compare the simulated behavior from this alternative model in relation to that of the baseline model above.

[$y_t = 0 \forall t$, $\theta = 0$ and $p_s = 1$ gives the baseline model.]

References

KLEVEN, H. J., C. LANDAIS AND J. E. SØGAARD (2019): "Children and gender inequality: Evidence from Denmark," *American Economic Journal: Applied Economics*, 11, 181–209.