47-813 Econometrics III
Assignment 2

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2022 Mini 3

Overview: In this assignment, we will use Monte Carlo studies from Arcidiacono and Miller [2011]. You will explore small sample properties with a Monte Carlo experiment and compute some counterfactuals for the underlying structural model, the main purpose for doing structural analysis. This assignment should be undertaken in groups of two to three. The assignment requires your group to prepare a report with an appendix attached explaining how you modified the codes. Please report the specification of your computer-CPU (and cores), GPU (if you use it), etc.

1   The Bus Engine Problem

These questions are related to Table 1 from Arcidiacono and Miller [2011].

1. Change one or more parameters in the DGP and report the results using FIML and CCP for cases where i) s is ignored (column 2 and 3) and ii) s is unobserved (column 5 and 6). Discuss the estimation result.

2. Change the number of buses and/or periods and estimate again (no need to do FIML from here on). How do the changes affect the standard errors?

3. Record some useful statistics of the data you generated from the modified DGP (for example, replacement rate).

4. Run the counterfactual analysis of your choice based on your estimates. Does your result from counterfactual experiment match with your intuition?

2   Entry-Exit Game

These questions are related to Table 2 from Arcidiacono and Miller [2011].

1. Arcidiacono and Miller [2011] proposes three alternatives when updating the CCPs. Discuss what are the pros and cons for each approach. Choose one of the methods you will use in the following questions and explain why you chose it.

2. Change one or more parameters in the DGP and report the results when i) s is ignored (column 3) and ii) one of the methods to update the CCPs when s is unobserved (columns 4 through 6). Discuss the estimation result.

3. Record some useful statistics of the data you generated from the modified DGP (for example, firm exit rates).

4. Run the counterfactual analysis of your choice based on your estimates. Carefully describe how you run the counterfactual analysis. Does your result from counterfactual experiment match with your intuition?

5. Arcidiacono and Miller [2011] notes that in a two-player game, information on prices is useful for estimating the structural parameters. Present your estimation results similar to Table 2 in a two-player game by using the same ground-truth parameters used in the paper.

References

P. Arcidiacono and R. A. Miller. Conditional choice probability estimation of dynamic discrete choice models with unobserved heterogeneity. *Econometrica*, 79(6):1823–1867, 2011.