

The Results Section of a Computational Economics Paper

Dr. Richard W. Evans

April 22, 2020

Review: Order of paper production

- ① Data section and Theory/model section
- ② Results
- ③ Conclusion, Intro, Abstract

Purpose of results section

Reveal how your combination of data and model answer your research question

Different types of papers

- Need a model (and model section)
 - Estimation
 - Reduced form estimation (time series, IV, categorical)
 - Structural estimation
 - Computational solution
 - Predictive, Statistical/machine learning
- Don't necessarily need model (but likely combine)
 - Descriptive (big data I/O, scraping, stylized facts)
 - Experiments (digital platforms)

Reduced form results section

$$y_i = \beta_0 + \beta_1 x_{1,i} + \beta_2 x_{2,i} \dots + \varepsilon_i$$

- Describe estimation method (OLS, IV, MLE, NLLS)
- Report coefficient estimates $\hat{\beta}_p$, tables
- Report standard errors (statistical significance)
- Describe identification.
 - How did the data identify one coefficient as distinct from the others?
 - Discussion of multicollinearity, homoskedasticity, endogeneity
 - Discussion of misspecification, omitted variables
- Interpretation of coefficients
- Robustness



Reduced form results section Examples

- Bell, Alex, Raj Chetty, Xavier Jaravel, Neviana Petkova, and John Van Reenan,, “Who Becomes an Inventor in America? The Importance of Exposure to Innovation,” *Quarterly Journal of Economics*, 134:2, pp. 647-713 (May 2019)
 - Lots of description of the data before getting to estimation
 - Look at estimation tables III to VI

Estimation Section

Main goal of Estimation Section

The Estimation Section of a structural estimation paper connects the content of the theory section with the content of the data section.

- You may want a separate results section if your post-estimation experiments require a lot of discussion (see last slide)

Structural estimation results section

- Describe which parameters are calibrated (weak calibration), and which parameters are estimated
 - Why did you choose to estimate those particular parameters and not the others?
 - What effects on the results might that choice have?
 - Example: [DeBacker, et al \(2017\)](#) Table 2, p. 20.
- Describe how data are mapped into model variables
 - Real world data often not perfectly represented by what is in your model
 - Example: [DeBacker, et al \(2017\)](#) Appendix A-2, p. 49

Estimation Method

- Describe your estimation method
 - GMM, MLE, SMM, bayesian, indirect inference
 - What is your criterion function?
 - How many iterations to solution, computation time, processors, optimization stats
 - Evidence of global maximum/minimum (robustness)
- Some of this discussion might be reserved for appendix
- All code and data should be open source and easily replicable
 - Caveats: private data, poachable topic
- Robustness. What does that look like here?

Measures of fit

- Give your parameter estimates and their standard errors in a table
 - Include number of observations and other estimation stats like likelihood function value or criterion function value
- Show your inside moments, their errors, and their standard errors
- Show your outside moments (moments not used for estimation)
 - These moments are a nice measure of how good your model is
 - Example: [DeBacker, et al \(2017\)](#), Fig. 5 p. 24, Tab. 5 p. 36
 - Outside moment is the variance of log wealth. Does not match well

Structural estimation results section examples

- Rust, John, “Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher,” *Econometrica*, 55:5, pp. 999-1033 (Sep. 1987)
 - Estimates of cost function parameters in different slices of data, Tabs. 5, 6
 - Specification tests: Tab. 8
 - Hypothesis tests using estimated coefficients and standard errors: LR tests, Tabs. 9, 10
 - Key figures: Fig 5, 6, 7
 - No good demonstration of outside moment fit or lack thereof

Structural estimation results section examples

- Altonji, Joseph G., Anthony A. Smith, Jr., and Ivan Vidangos, “Modeling Earnings Dynamics,” *Econometrica*, pp. 1395-1454 (July 2013)
 - Section 4: Estimation Methodology
 - Good specification of MLE problem
 - Tables 4A, 4B give estimation results
 - Tables 5A, 5B show something similar to outside moment fit
 - Results are interesting variance decompositions

Stuff

- Describe computational solution algorithm
- What are the solution tolerance assumptions/criteria
- How much computation time, hardware
- Discuss robustness issues

Computational results section examples

Evans, Richard W. and Kerk L. Phillips, “[OLG Life Cycle Model Transition Paths: Alternate Model Forecast Method](#)”, *Computational Economics*, 43:1, pp. 105-131 (Jan. 2014).

Machine learning results section

- Discuss feature importance
- Detail resampling strategy
- Discuss ensemble method components
- Hypertuning approach
- How much computation time, hardware
- Focus on measures of fit (MSE, rMSE, AUC, ROC)
- Any feature effects (like marginal effects)
 - Permutation importance (See Siyuan [Mike] Peng thesis)

Machine learning results section examples

- Journal of Machine Learning Research