

607

Elementary to advanced  
and on to modern advanced econometrics, II

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► **Wrapping up and moving on**

- The advanced econometrics we've been discussing are quite simple and elegant
- So long as our economic models are smooth and certain statistical regularity conditions apply to underlying statistical processes
- We don't need to understand much more than minimizing quadratic forms

OLS, 2SLS, SUR, GLS, IV, GMM, ...

- And estimates are asymptotically normal
- And efficiency is guided by the GLS principle
- And we get a standard family of  $\chi^2$ ,  $t$ , and  $F$  tests familiar from the least squares context, but justified as asymptotic approximations.

► **But,**

- But in practice, naively applying these procedures leads to very unreliable results in many cases.
- Another way of saying this is that the techniques we derive under standard asymptotic approximation do not uniquely pick out a way to proceed.
- Instead, every instance of a sensible procedure generally suggests an entire family of asymptotically equivalent procedures

e.g., one consistent estimator implies an arbitrarily large family of consistent estimators.

- And the three lectures in this section make clear that in relevant samples sizes and applications in macro, it matters which instance we pick.

► **One Major Conclusion**

- One major conclusion these lectures illustrate and that I will emphasize throughout:  
If you don't have a good basis for choosing one technique from a large family, you should find some way to evaluate if answers to questions of interest are sensitive to your choice.
- Generally, Monte Carlo is one way to assess such issues.

► **Another major conclusion**

- We'd like to find a more refined theory that will help us understand and structure these decisions.

Higher order asymptotics and functional central limit theorems provide one route to such theory.

► **Finally,**

- We could take several directions to explore these
- But I find the issues most easy to discuss in the context of hypothesis testing.