Econ7115: Structural Models and Numerical Methods in Economics
Assignment W11

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Due 23 April 2025

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1. Consider the workhorse model of trade and industrial policies in Week 5

   - The only policy in interest is import tariff; there are no export tariffs and industrial subsidies
   - Time-invariant parameters directly from the data: $\left(\alpha_n^j, \gamma_i^j, \gamma_i^{k,j}\right)$
   - Time-invariant parameters to be estimated: (θ^j, ψ^j)
   - Data: pre-trade-war trade flows and tariffs $\left(X_{in}^{j,0}, t_{in}^{j,0}\right)$; post-trade-war trade flows and tariffs $\left(X_{in}^{j,1}, t_{in}^{j,1}\right)$

   1. Given $\left(X_{in}^{j,0}, t_{in}^{j,0}\right)$ and all time-invariant parameters, which time-varying shocks are required to rationalize $\left(X_{in}^{j,1}, t_{in}^{j,1}\right)$?
   2. Utilize the "exact-hat" algebra to compute $\left(X_{in}^{j,1}, t_{in}^{j,1}\right)$, given $\left(X_{in}^{j,0}, t_{in}^{j,0}\right)$, all time-invariant parameters, and time-varying shocks specified above.
   3. Suppose that tariff changes are exogenous. Please construct IV estimators for θ^j and ψ^j.
   4. Suppose that we are interested in changes in trade shares, $\left(\lambda_{in}^j\right)$, led by tariff changes. Please derive an IV-based test to validate the causal effects of tariff changes on changes in trade shares predicted by the model, a la Adao, Costinot, and Donaldson (2024). Please derive the test statistics and its asymptotic distribution. (Hint: make use of the "exact-hat" algebra; be careful about the definition of model's predictions)