ECON 714A - Problem Set 4

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This problem asks you o solve a model of oligopolistic competition from Atkeson and Burstein (AER 2008), which extends the Dixit-Stiglitz setup and is widely used to analyze heterogeneous markups and incomplete pass-through.

Consider a static model with a continuum of sectors $k \in [0,1]$ and $i = 1, ..N_k$ firms in sector k, each producing a unique variety of the good. Households supply inelastically one unit of labor and have nested-CES preferences:

$$C = \left(\int C_k^{\frac{\rho-1}{\rho}} dk \right)^{\frac{\rho}{\rho-1}}, C = \left(\sum_{i=1}^{N_k} C_{ik}^{\frac{\theta-1}{\theta}} dk \right)^{\frac{\theta}{\theta-1}}, \theta > \rho \geq 1.$$

Production function of firm i in sector k is given by $Y_{ik} = A_{ik} L_{ik}$.

1. Solve household cost minimization problem for the optimal demand C_{ik}, the sectoral price index P_k, and the aggregate price index P as functions of producers' prices.

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2. Assume that firms compete a la Bertrand, i.e. choose P_{ik} taking the prices of other firms in a sector $P_{jk}, j \neq i$ as given. Derive demand elasticity for a given firm and the optimal price.

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3. Prove that other things equal, firms with higher A_{ik} set higher markups.

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4. Assume that $\rho = 1, \theta = 5, N_k = 20, and \log A_{ik} \sim i.i.d.N(0,1)$. Solve the model numerically by approximating the number of sectors with $K = 100,000$. You will need an efficient algorithm to compute a sectoral equilibrium (search for a fixed point, do not use "solve") nested in a general equilibrium loop solving for real wages.

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5. Compute the aggregate output C of the economy and compare it to the first-best value.

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6. Bonus task: Does the sectoral equilibrium converge to the one under Betrand competition with homogeneous goods in the limit $\infty \to \infty$?

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*I worked on this problem set with a study group of Michael Nattinger, Andrew Smith, and Ryan Mather. I also discussed problems with Sarah Bass, Emily Case, Danny Edgel, and Katherine Kwok.