# Economics 8601: Industrial Organization

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**University of Minnesota, Fall Semester 2000, Mini I**

# Final Examination

**October 24, 2000**

**Do any three out of the four questions. Questions are weighted equally. If you do more than three questions, please indicate which three you would like graded. The examination is two hours, open book, open notes.**

### 1) Business turnover decisions

Recall that in the Holmes and Schmitz model, match quality is given by $q_M^t = \mu + x_t$, business quality is given by $q_B^t = \beta + y_t$, and per-period utility from owning a business is given by $q^t = q_M^t + q_B^t$. The authors estimate this model with data that tracks enterprises over two periods, based on the age of business, tenure of manager, and whether the owner is the founder (founder status) in the first period and whether the business has been sold, kept or discontinued by the second period.

a - For a fixed $\mu$ and $\beta$, explain what governs the equilibrium decisions to Buy, Sell or Keep a business as a function of $x_t$ and $y_t$. Graph the decisions as a function of $x_t$ and $y_t$. (Hint: as in Holmes and Schmitz, you may want to define the equilibrium price of a business with a given $\beta$ and $y_t$ of 0.)

b - Suppose that you modify the model so that match quality $q_M^t = 0$. Why would this yield a model with zero likelihood?

c - Now suppose that you tried to estimate the base model with only one year of data instead of a panel. How might this be problematic in identifying the model? What different underlying characterizations would now be observationally equivalent?

### 2) Market size and market structure

Recall that in the Sutton exogenous sunk cost model, market structure is determined via a two-stage game. In the first stage, there is an infinite supply of potential firms who choose whether or not to enter into production of the homogeneous good. In the second stage, the firms that entered engage in some form of competition, either Bertrand, Cournot or cartel.

a - Consider the limiting number of firms N as the market size S grows large, under Bertrand, Cournot and cartel regimes. Under which regimes will $1/N$ converge to 0? (I don't want to see a derivation of millions of Cournot formulas. I do want to be convinced that you understand the underlying basis of these formulas.)

b - Recall that Bresnahan and Reiss define $s_N$ to be $S_N/N$ and $S_N$ to be the minimum market size such that N firms will enter. Given Sutton's model, under which of the three regimes will $s_N$ be a strictly increasing function of S?

(continued...)

**3) Learning and advertising**

a - Recall that Ackerberg defines two consequences from advertising: a consumer directly benefits from her perceived level of advertising intensity (a prestige effect) and also obtains a signal of the quality of the product from her perceived level of advertising intensity (a signaling effect). Consider an Ackerberg-type consumer who values the future so that her discount rate $\beta$ is greater than 0. Why would this consumer behave differently then if the consumer were myopic, where $\beta = 0$? Would the myopic and non-myopic consumers behave differently if advertising had only a prestige effect? What if advertising had a signaling and prestige effect, but the consumer assessed a prior correlation of zero between her prior quality of the good and the level of advertising?
b - In Crawford and Shum's learning model, the state space for patient j is his prior means and variances of the utility $x_{jnt}$ from drug n. Now suppose that the shocks to the utility $x_{jnt}$ are serially correlated so that utility $x_{jnt} = \mu_{jn} + \varepsilon_{jt}$ where $\text{Corr}[\varepsilon_{jt}, \varepsilon_{j,s}] > 0$. Why must the consumer's state space now include the prior covariance between the different drugs?

**4) Network externalities**

Suppose that you have a good with a potential network externality such as the automated clearinghouse (ACH) system. Your goal is to test for the presence of network externalities. Assume that price is set exogenously by the Federal Reserve Bank. You have usage decisions for a panel of many separate markets over several months.

a - Explain how you can identify network externalities from exogenous differences in market concentration across markets. What econometric methods would you use to test for network externalities and what methods would you use to estimate the network externalities? Is this test robust to correlations in the unobservable per-period fixed cost of banks in a network?
b - Now suppose that firms in concentrated markets can charge a higher markup from ACH than firms in unconcentrated markets and consider the null hypothesis of no network externalities. How will the probability of adoption in concentrated markets differ from the probability of adoption in unconcentrated markets (even in the absence of network externalities)? How will the quantity of ACH conditional on adoption differ ? (Hint: think of the Bresnahan and Reiss model.)