ECON 7130 - Microeconomics III

Spring 2015

Notes for Gowrisankaran and Town (*Health Services Research*, 2003)

Question:

- What is the effect of hospital competition on quality of care?

Identification:

- Test the comparative statics (qualitative predictions) of the model
- Test hypothesis by OLS - see if sign of coefficients is the same as model prediction
  - OLS regressing competition on quality measures, controlling for other covariates
  - Key assumptions: competition is exogenous to quality
  - Identification aided by using separate quality measures that differentially affect HMO vs Medicare groups

Tools:

- Herfindahl index
- OLS

Outline of Model

1. Specification of Environment
   (a) Population of agents
      - Patients
        - Medicare patients
        - HMO patients
      - Hospitals
   (b) Preferences
      - HMO patients: demand = $x_H(q, p_H)$
      - Medicare patients: demand = $x_M(q)$
      - Hospital: $\pi = p_M x_M(q) + p_H x_H(q, p_H) - c(x_M, x_H, q)$
   (c) Production technology
      - Cost function: $c(x_M, x_H, q)$
        - $\frac{\partial c}{\partial q} > 0$, $\frac{\partial^2 c}{\partial^2 q} > 0$
        - $\frac{\partial c}{\partial x_i} > 0$, $\forall i$
      - q applies to all patients
   (d) Information technology
      - Full info
        - Patients know price and quality
        - Hospitals know who serving

- But in empirical component of paper, say that patients may not have perfect knowledge of q - that this is an empirical question

(e) Enforcement technology

- N/A

(f) Matching technology

- Decentralized, competitive market where hospitals and patients meet

2. Equilibrium

- Nash Equilibrium
- Though they abstract from this eq'm concept and parameterizing the degree of non-competition with elasticities, $\varepsilon_{q,H}$, $\varepsilon_{q,M}$

Model outline:

- Hospitals choose price and quality to maximize profits
- Patients choose hospitals, trading off price for quality
- Medicare patients are not sensitive to price
- Hospitals can't give different patients different quality of care and cannot choose medicare patient price
- Thus, hospitals trade off higher quality to attract HMO patients at higher prices, but this increases costs of Medicare patients

Demand:

- Abstract from utility functions and provide us with generalized demand functions: $x_M(q)$, $x_H(q, p_H)$

Supply:

- Determined by FOC's of profit function:
  1. $\frac{\partial \pi}{\partial p_H} : x_H + (p_H - mc_H)\frac{\partial x_H}{\partial p_H} = 0$
  2. $\frac{\partial \pi}{\partial q} : (p_M - mc_M)\frac{\partial x_M}{\partial q} + (p_H - mc_H)\frac{\partial x_H}{\partial q} - \frac{\partial c}{\partial q} = 0$
- The solution here is actually a complicated Nash Eq'm, because the derivatives of the demand function with respect to price and quantity are functions of the prices and quantities of other hospitals
- G+T thus simplify things by parameterizing the degree of competition (which affects these partials) using demand elasticities:
  - $\varepsilon_{q,M} \equiv \frac{\partial x_M}{\partial q}\frac{1}{x_M}$
  - $\varepsilon_{q,H} \equiv \frac{\partial x_H}{\partial q}\frac{1}{x_H}$
- This leads to the FOC for quality becoming: $(p_M - mc_M)x_M\varepsilon_{q,M} + (p_H - mc_H)x_H\varepsilon_{q,H} - \frac{\partial c}{\partial q} = 0$
- It is from this that they find their testable comparative statics. Namely:
  - $\frac{\partial q}{\partial \varepsilon_{q,M}} < 0$, if $p_M < \bar{p}$ (i.e., if the margin is negative)

  - $\frac{\partial q}{\partial \varepsilon_{q,H}} =$? This is main question - what does competition do to quality?
  - $\frac{\partial p_H}{\partial \varepsilon q,H} =$? They cite others who have done this - depends on how model costs and hospital objective
- Remember - if competition increases, then demand is more price elastic (i.e., $\varepsilon_{q,i}$ increases)

Data:

- Need data on competition, quality of care
- Competition:
  - Have patient level data on hospital admissions from OSHPD patient discharge database.
  - This is used to estimate logit model of prob choose hospital
  - The estimated probabilities are then used to construct a Herfindahl index as a proxy for competition in each group (HMO and Medicare patients, diagnosis type)
- Quality:
  - Risk adjusted mortality rates
  - Use rates from other papers (happen to be for group of hospitals they are looking at because authors wrote one of the papers they cite)
  - Rates for acute myocardial infarction (AMI) and pneumonia
  - Both have high mortality rates (14.9% and 9.5%)
  - AMI relatively more effect on young (non-Medicare group)
  - Pneumonia relatively more effect on old (Medicare group)

Identification:

- OLS w/ cross-sectional data
- Findings:
  - Increased competition for Medicare patients lowers quality
  - Increased competition for HMO patients increases qualiy
- Policy experiments - simulate effects of mergers on quality