ECON8854 - Industrial Organization II

Lecture Notes from Charlie Murry and Michael Grubb's lectures

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Contents

Chapter 1

Nonlinear Pricing

1.1 Two types

This section covers the model of nonlinear pricing where a monopolist offers a menu of two quantity/quality-price pairs to consumers of two types (H, with high value for the good and L with low value).

Without loss of generality, we consider contracts such that each type chooses a contract and has no incentives to deviate. The monopolist chooses a quantity/quality and a price for each contracts, such that its profits are maximized. We get a problem with three elements: (1) an optimization problem, (2) a set of participation constraint (making sure each type buys the contract) and (3) an incentive constraint (making sure no type deviates).

The results of this model tells us that the optimal contracts are designed in such a way that the quantity/quality of the highest type is not distorted, while for the lowest type, they will receive a lower quantity/quality than their first best!

1.2 Continuous types

The continuous types model has the same structure as the one presented in the previous section, however, now types lie on a continuum from lowest to highest. As before, the model is separated in the three same parts and display a similar distrortion where consumers of the highest types get their first best contract, while the lowest types get lower quantity/quality.

1.3 Crawford and Shum (2007)

1.3.1 Summary

The research question of this paper is: "To what extent is quality degradation prevalent in cable TV markets? And what are the effects of regulation on this issue?"

They add quality to the decision of the monopolist (add a dimension). Because of imperfect competition, we might think that quality will also be distorted (as prices are), which would create welfare losses. This is the framework of Mussa-Rosen, which is applied to the setting of cable TV.

Mussa-Rosen

There are three types of consumers (one to allow some consumers to not care about cable TV), and two contracts. The model displays distortion for the lowest types and no distortion at the top. They further go to show that this result holds even if consumer types are continuous if qualities are discrete.

Regulation is set up as a constraint on the optimization problem such that quality cannot go lower than a certain point. This turns out to only restrict the lowest quantity, while the top quantity stays undistorted.

Cable TV industry

Contracts are based on bundles of networks. Basic service is the one that everyone has, then you can buy extended service or premium (maps well to theory presented before, but premium is ignored because horizontal differentiation).

Bundle quality is measured in two ways: number of networks in said bundle (assuming same underlying quality) or through the implied values from consumer distribution (a first-stage problem from Mussa-Rosen).

Empirical model

Results

Quality distortion is present. Regulation mitigates the problem.

1.3.2 Discussion

The theory clearly lacks horizontal differentiation between contracts! Because of this, they ignore some data.

Functional form dictates a lot of the results!

Chapter 2

Price Discrimination

2.1 Dana (1999)

2.1.1 Model

- Consumers on a continuum of types with unit demand.
- Firm has marginal production and capacity cost.
- Firm chooses price before learning demand.
- Proportional rationing imply all types have access and buy to the good proportionately.

2.1.2 Residual Demand

- Residual demand is very important:
  - Start with any price, say $\tilde{p}$: some people buy, some don't, say $\tilde{q}$ have bought.
  - Residual demand at another price, say p is not simply base demand - $\tilde{q}$, because some of those who bought at $\tilde{p}$ would not have bought at p = use proportional rationing to determine residual demand

2.1.3 Perfect Competition

- Competitive market = profit is 0 (but probability!)
- Price dispersion: from $\underline{p}$ to $\bar{p}$

2.1.4 Monopoly

- Market power imply markup: prices support is narrower!

2.1.5 Price Dispersion and Market Structure

- Two results:
  - Support of prices widens with competition.
  - Variance of prices increases with competition (given linear demand).
- In summary: price dispersion increases with PTR (which increases with competition).

2.2 Leslie (2004)

2.2.1 Background

The paper answers the question of welfare effects of price discrimination (consumer = ambiguous; firms = positive). Broadway play where second and third degree price discrimination. Second degree happens because of different seats are offered at different prices based on quality (nonlinear pricing as in Dana (1999)). Third degree is targeted coupons. Finally, discount sales for day-of-performance tickets is damaged goods. Same marginal cost for all seats but capacity costs (again, as in the Dana paper).

2.2.2 Data

Unit of observation is a seat (price, quality, discount, etc). Aggregate discount into two categories (coupons or booth). Aggregate advertising is observed. Competing plays attendance is observed. Finally, consumer variables in the NYC region are observed.

2.2.3 Model

Product space approach.

2.2.4 Assumptions

2.2.5 Results

Main result is that price discrimination improves welfare! But all types of PD are suboptimally designed.

2.2.6 Discussion

Chapter 3

Search

Chapter 4

Switching Costs

4.1 Effects

4.1.1 Model 1: Investing and Harvesting

- Firms "invest" in consumers by lowering their prices below marginal cost, then "harvest" their loyal base by extracting all surplus!
  - Only if switching cost is high enough and perfect competition!
  - Welfare is intact (average price is still marginal cost)
- No switching in equilibrium.

Model 1a: Add heterogenous values

- Now there is a DWL: consumers with high value of the good lose!
- No switching in equilibrium.

Model 1b: Add heterogenous switching costs

- Identical welfare outcomes but more switching (those who have low draws of switching costs).

4.1.2 Model 2: Hotelling Duopoly

- Distance between consumer taste and firm is key to compute demand.
  - Consumer has $\theta \in [0, 1]$ in both periods, firms are at 0 and 1.
  - Budget is B.
  - Transportation cost is τ.

Model 2a: Taste is known and stable

- As if no switching costs (same equilibrium as pure Hotelling).
- No switching in equilibrium.

Model 2b: Taste in second period is unknown

- Average price is half of previous model!
  - This is because when the decision is made, products are not differentiated (taste unknown), thus firms need to "invest" harder.

Model 2c: Consumer myopia

- Same as model 2b!
  - Same intuition, myopia means that second period does not come into decision, thus attracting consumers is harder.

4.2 Measurement

4.2.1 Measuring switching costs or inertia

- Challenge: is it switching costs or persistent heterogenous preferences?
  - Osborne (2011): look at previous period event's effect on current period (price cut increases probability to buy again? = switching costs).

    - Handel (2013): look at difference between old and new consumers (if old buy more than new = inertia)

4.2.2 Decomposing inertia

- Inertia is: switching costs, habit formation, search costs, learning, inattention, etc.
    - Usually only one form is considered (others assumed away) = bad (Wilson, 2012)

4.2.3 Comments on Wilson (2012)

- Insight: a 1$ search cost has more impact than a 1$ switching cost because:
    - Searching will cause the cost with probability 1, while switching is only incurred if better option available
    - Potential of multiple searches, while only one switch
    - Inversting from firms might help consumers offset cost
- Thus, design a "quick and easy" method for estimating search and switch costs:

4.3 Honka (2014)

4.3.1 Summary

Background

Insurance markets can be inefficient for many reasons, two of them being search costs and switching costs (market frictions). What is their value in the auto insurance market? And do they affect consumer choice and welfare? are the two questions Honka (2014) answers. Auto insurance market is perfect in the sense that it includes both (very high retention rate). Honka puts both types of costs in her model: new thing in the literature‼

Data

the observation unit is a transaction, with contract observables (prices, premium, etc.), consumer observables (previous contract, number of quotes, by whom, and demographics, etc.). Consideration set is very important to identify search costs, previous contract to identify switching costs (but no panel data).

Model

Multinomial logit model with a search + previous insurer consideration set. There a "first-step" search model based on expected utility to decide how many searches.

Estimation

Simulated semi-parametric way of recovering number of searches (analogous to ordered probit?). With consumer beliefs, recover search costs. Finally, switching costs are inside RUM model.

Assumptions

Main model assumptions are: (1) search and purchase are conditional on coverage (no search across coverages); (2) search is used to discover prices only and (3) search is simultaneous rather than sequential.

Other assumptions include: static preferences (utility fixed effect is not correlated with previous choice); switching costs are not exactly identified (confounded with heterogenous persistent preferences.

Results

Search costs are three times higher than switching if made in person, but comparable if made through internet. Search costs are what drives most of the retention.

Both have negative effects on welfare.

Chapter 5

Learning

5.1 Literature Review

5.2 Covert (2015)

5.2.1 Summary

The research question in this paper is: "Do firms learn (in production)?"

Using data on hydraulic fracturing in the Bakken Shale and a model of input choice under technology uncertainty, Covert shows that firms only learned partially, leaving out 40% of profits in the process.

Background

New industry after advances on how to extract shale gas. Almost 1000% growth in 8 years.

Fracking is pumping a mix of sand, water and chemicals in the ground = choice to make on the "recipe" that affects production and costs! But no one knew at the time how to do it = opportunities for learning.

Firms have their own data (private for 6 months) and then get access to other data (after six months).

Evidence for learning

Covert looks for three types of learning: (1) is experience (age of firms) correlated with productivity (oil per well drilled)? Which is estimated using a Benkard type of model. (2) is the choice of inputs more profitable over time? which is estimated using ex ante and ex post profits comparison.

Results

One of the first empirical analyses of learning behavior in production. Find that firms increased the profit capturing rate from 20% to 60%. No experimenting to learn as firms go to more certain input choices. Firms overweight their data compared to other firms' data.

5.2.2 Model

Production function

The output is log-log specified as a function of:

- t: the number of days of operation of the well.
- D: the number of days of production.
- H: length of the well.
- Z: other topologic controls
- ϵ: well-specific shock
- ν: idiosyncratic shock

Profits

Firm's profits depend on the usual stuff: share, market size, price, and cost of inputs.

Preferences

Firms get utility from the mean profit and standard deviation of profits given an input.

Gaussian Process Regressions

5.2.3 Comments

Results

Firms underutilize sand and water but: are costs measured correctly? If costs are convex, then findings corroborate optimal choice? Overestimate return to production?

Public policy

Delayed disclosure of information lowers barriers to entry while leaving rents on the table.

Experimenting

Nice framework but conclusion too hasty? Experimenting is too linked with risk, what if even when experimenting firms would choose safe levels of inputs? Or sub-optimal experimenting?

Other questions

Risk aversion or myopia?

Prior beliefs are correctly specified?