# Discussion: De los Santos and Koulayev (2012)

### Question

### Which ranking mechanism maximizes CTR when

- the goods have multiple heterogeneous characteristics
- the consumers have obs. and unobs. heterogeneity in taste.
- key decision variable, the price, varies in time and the cross-section

### Why it is interesting

- Industry with \$30 billion revenue in 2011 [1]
- Recommended pages on Facebook, product recommendation in Amazon and sponsored ads at Google, etc.
- Mechanism is crucial for exit and entry  $\Rightarrow$  resource allocation [2]

### What's new

- Model utilizing obs. and unobs. heterogeneity of the searcher when computing the ranking
- Application where the key decision variable, price, varies over time and the cross-section

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## Summary

Think of an auction of slots where everybody bids the same. How would you go about ranking the alternatives?

- randomize the slots?
- Weight with a quality score, assign slots?

Google's quality score consists of

- previous CTR (myopic popularity based algorithm)
- 2 Relevance based on the request
- "Quality" of the landing page

The paper suggest producing a quality score based on

 $\bullet$  obs. and unobs. characteristics of searcher

Inner workings of the mechanism

- More suitable choices are ranked higher
- The choice set consists of ore suitable alternatives

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## How to improve the paper (1)

The platform runs a two sided matching mechanism [3].

- Consumers likes to see relevant alternatives
- Producers pays to be viewed by relevant consumers
- The platform proposes a match which maximizes some value function

The proposed model considers the consumer side of the platforms maximization problem.

- It is important to investigate the producer side since
  - sponsored ads are important for the platforms revenue
  - the mechanism can have an effect on the behavior of the producers (bidding, pricing)

# How to improve the paper (2)

$$u_{ij} = -\alpha_i p_{ij} + \beta'_i \mathbf{X}_j + \delta L_{ij} + \varepsilon_{ij} \tag{1}$$

 $\varepsilon_{ij}$  idiosyncratic preferences, *i*-th consumer, *j*-th hotel

• logistic distribution vs. uniform distribution

Both yield closed form solution for  $\mathbb{P}(j|A, C_i, P_i, R_i)$  where A is the choice set.

- logit yields similar demand schedules like Tversky model
- uniform yields the demand schedules from Hotelling model

Which to use

- Uniform yields simpler expressions and makes interpretation of the coefficients easier
- Logit might be a more realistic representation of the idiosyncratic preferences

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# How to improve the paper (3)

- The optimization program is to choose a ranking to maximize the CTR.
- CTR is the expected utility integrated over the distribution of price sensitivity
- Welfare comparison: it seems you are compare the difference in expected utility between an optimal ranking and a myopic popularity-based ranking
- It seems the conclusion follows from the setup

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