The Effects of Regulating Food Delivery Platform Design

Commission fees, search preferencing and entry

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Consumers $\rightarrow$ **Platform** $\leftarrow$ *Producers*

Platform gives incentives to consumers and producers through its **design** choice.

- **Guiding** consumers to producers.
- **Rewarding** producers in the platform.
- **Attracting** consumers and producers.

Policy interest: how should we regulate the platform ”design” choice?

1. **Search Preferencing**: should platforms be allowed to preference certain producers over others?
2. **Commission contracts**: should platforms be allowed to offer different commissions to different producers?

- **Regulators** interested in understanding the welfare consequences of different designs.
- **Firms**: how do design choices affect producer/consumer entry and welfare.

IDEAS

How Google Alters Search Queries to Get at Your Wallet

Testimony during Google's antitrust case revealed that the company may be altering billions of queries a day to generate results that will get you to buy more stuff.

MEGAN GRAY

10.02.23 08:10 AM

Losing McDonald's Deal Part of Deliveroo Leaving Spain, Former Employees Say

Examples of designs

Search Preferencing:

- Google allows sponsored search through Ad auctions.
- FB advertising offers the possibility to promote content in main wall.
- Uber Eats sponsors some restaurants in search.

Differential commissions:

- Netflix pays different royalties to different producers.
- Spotify pays Joe Rogan 200M dollars.
- Uber Eats offers lower commissions to big chains.

Two important design choices

1. **Search preferencing**: sponsored slots in rankings (ranking function $\boldsymbol{r}$).
2. **Commission fees**: percent of payments from producers ($\boldsymbol{\tau}$).

$$\implies \text{Platform chooses a design } (\boldsymbol{\tau}, \boldsymbol{r}).$$

Effect of $(\boldsymbol{\tau}, \boldsymbol{r})$ on surplus depends on how it influences

1. Attractiveness of platform to new users.
2. Relative demand for producers within the platform.

- **Positive story**
  Preference producer A $\implies \uparrow$ new users $\implies \uparrow$ demand for other producers.
- **Negative story**
  Preference producer A $\implies \sim$ new users & $\downarrow$ demand for other producers.

This Project

Research Question: what are the welfare implications of different choices of (τ, r)?

- Should platforms be allowed to bargain with *certain* producers for (τ, r) vs. offering the same contract to all?
- Consequences of imposing a fixed τ policy?
- Consequences of allowing producers to influence/bid/bargain for r vs. fixing a recommendation policy?

This Project

Empirical:

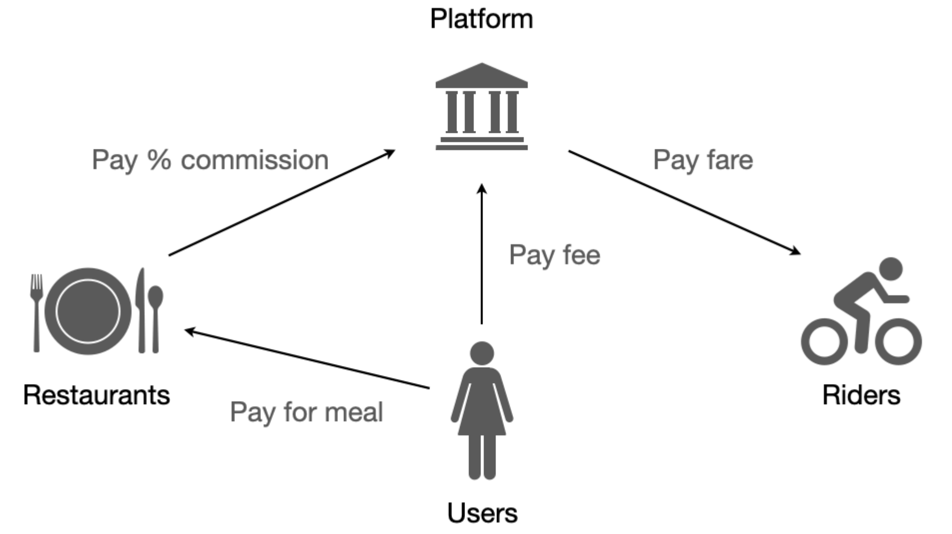
1. How does the design space (τ, r) look like?
2. Value of preferencing and causal effect of search rank.
3. Spillover effects of attracting big producers: the case of McDonalds.

Platform model:

1. Consumer/Producer entry.
2. Bargaining for (τ, r).
3. Demand influenced by ranks.

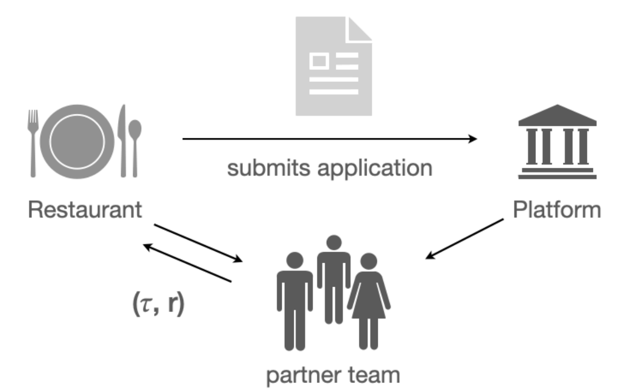
Empirical setting

Platform business



Platform bargains with *some* producers over (τ, r):

- τ: percent commission fee, flat $\sim 30\%$ for most producers.
- r: fixing the rank in the search wall $(1, 2, 3, 5, 7, 11 \ldots)$.



Platform Search - Example Contract

Restaurant j in city z for time period t bargains to get:

- **Percent commission** fee: $\tau_{jzt} = 25\%$.
- **Fixed positions**: 3rd in Wall, 1st under Japanese filter.

In general however the position contracts can be more **complex**:

- Time of day dependent.
- Different positions at different times/days.
- Different positions under different filters/search key words.
- Area dependent.

$\implies$ we will consider simplified ranking contracts $\bar{r}$.

The Data

Transaction data: for each order placed we see

- **Participants**: *user id*, *courier id*, *store id*, *dynamic session id*.
- **Payments**: prices, commission fees ($\boldsymbol{\tau}$), delivery fee, courier payment, tax paid.
- **Order details**: products bought, delivery time and distance, pick up/drop off location, time spent placing order.
- **Store details**: origin (wall, search/filters etc), position ($\mathbf{r}$), is fixed indicator, rating, type.
- **User details**: type of ranking arm (distance based, restaurant based, personalized or random!).

Sessions data: for each user session (*dynamic session id*)

- **State of wall**: stores the user saw and their rank.
- **User behavior**: stores clicked, time spent, impressions etc.

Scope:

- Transaction data w/out dynamic session link for 2015-2020.
- Transaction data + dynamic sessions for 2022-2023.

Toy model

Stylized model

Extends Yu (2024) by adding market expansion and strategic bargaining.

- A mass of consumers with mean utility $\delta_j - \alpha p_j +$ i.i.d logit shocks.
- 2 producers of different **qualities** δ_1, δ_2.
  1. Producer $j = 1$ is a **fringe** producer that always enters.
  2. Producer $j = 2$ is a **strategic/anchor** producer that pays fixed cost C to enter $\Rightarrow$ when it enters the market size *expands* by M.
- Platform mediates search through **rankings**:
  1. **Top** producer is seen by **all** consumers.
  2. **Bottom** producer is only seen by $(1 - \lambda)$ **fraction**.
  3. The *organic ranking* always shows $j = 1$ at the top.
- Platform chooses commission fees and rankings
  1. **Common contracts**: both producers are offered a common fee τ and the organic ranking.
  2. **Bargaining contracts**: producer $j = 2$ bargains with the platform for a commission fee τ_2 and the top rank. Producer $j = 1$ gets the bottom spot and τ_1.

Toy Model II

Demand:

- Consumers that consider only product j

$$s_j(p_j) = \frac{e^{\delta_j - \alpha p_j}}{1 + e^{\delta_j - \alpha p_j}}$$

- Consumers that consider both products

$$s_j(p_1, p_2) = \frac{e^{\delta_j - \alpha p_j}}{1 + \sum_{k=1,2} e^{\delta_k - \alpha p_k}}$$

Pricing: given commission fees and ranks $j = 1, 2$, producers set prices a la Nash-Bertrand to maximize profits

$$\pi_1(p; \tau) = (\lambda s_1(p_1) + (1 - \lambda) s_1(p_1, p_2))[(1 - \tau) p_1 - c_1],$$
$$\pi_2(p; \tau) = (1 - \lambda) s_2(p_1, p_2)[(1 - \tau) p_2 - c_2]$$

Toy Model III

Platform Profits if both enter

$$\Pi(\tau_1, \tau_2) = M[\tau_1(\lambda s_1(p_1) + (1-\lambda)s_1(p_1, p_2))p_1 + \tau_2(1-\lambda)s_2(\tau, p_1, p_2)p_2]$$

if only $j = 1$ enters

$$\Pi_1(\tau_1) = \tau_1 s_1(p_1)p_1.$$

- **Common contract**: platform chooses τ to maximize profits.
- **Bargaining contract**: platform chooses τ_2 in Nash-in-Nash bargaining to split surplus with anchor producer

$$\text{Joint Surplus} \equiv (\Pi - \Pi_1)^{\beta}(\pi_2 - C)^{1-\beta},$$

  where β is the bargaining weight, and sets τ_1 to maximize profits.

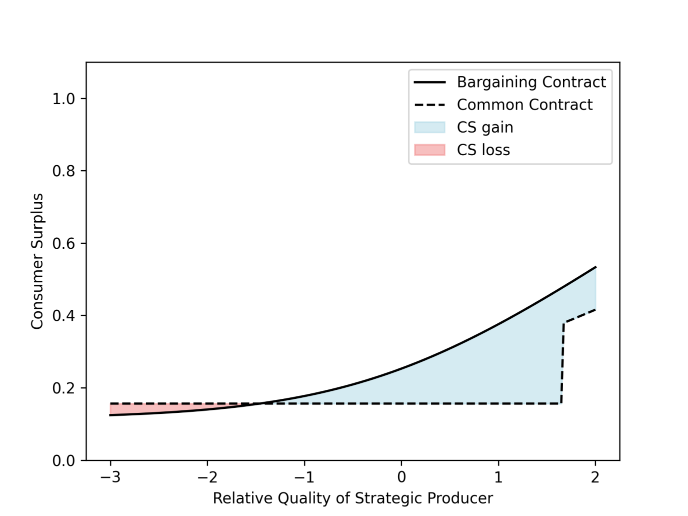
Key trade-off:

⇒ Bargaining favors *anchor*, but may be worth it if anchor *would not* enter otherwise.

⇒ Depending on δ_1 vs. δ_2, M, and C offering the bargaining contract may ↑↓ welfare relative to common contract.

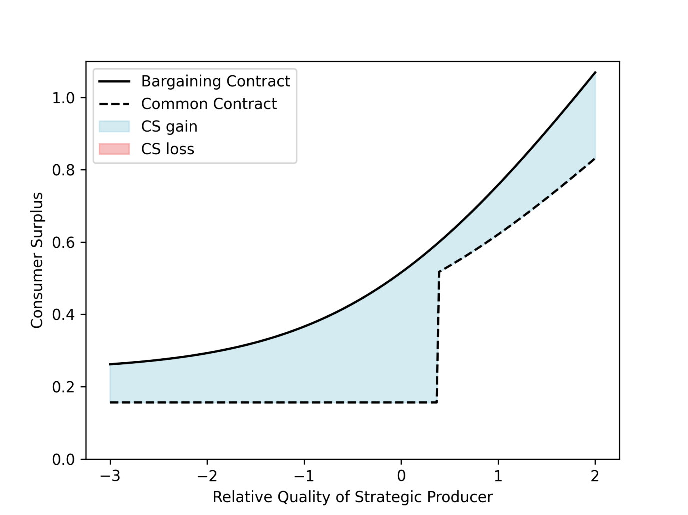
Toy Model: ambiguous welfare I

No market expansion ($M = 1$); Large entry cost ($C = 0.15$).



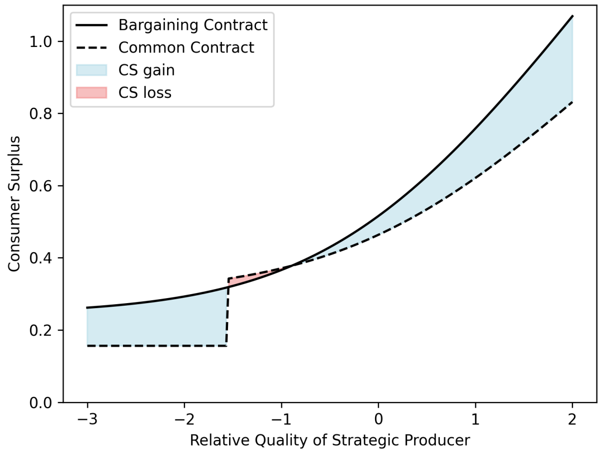
Toy Model: ambiguous welfare II

Large market expansion ($M = 2$); Large entry cost ($C = 0.15$).

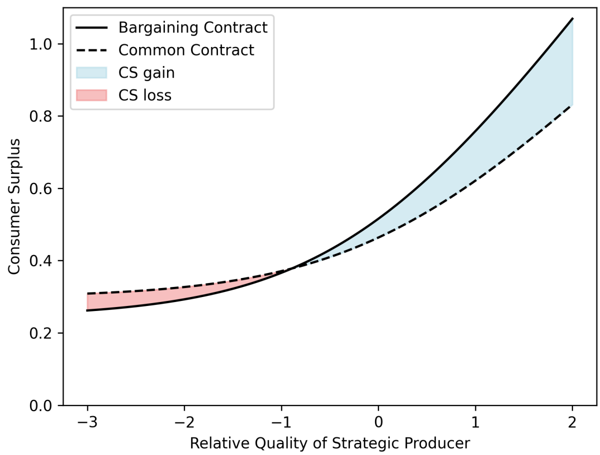


Toy Model: ambiguous welfare III

Large market expansion ($M = 2$); Medium entry cost ($C = 0.03$).

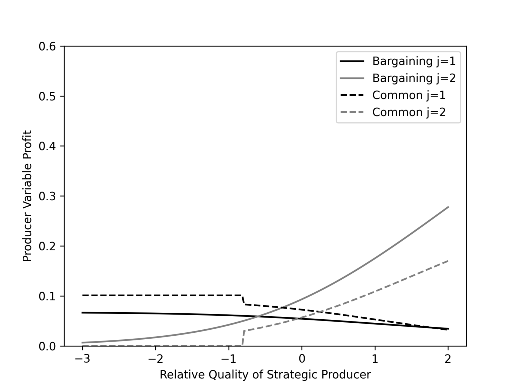


Large market expansion ($M = 2$); Small entry cost ($C = 0.005$).

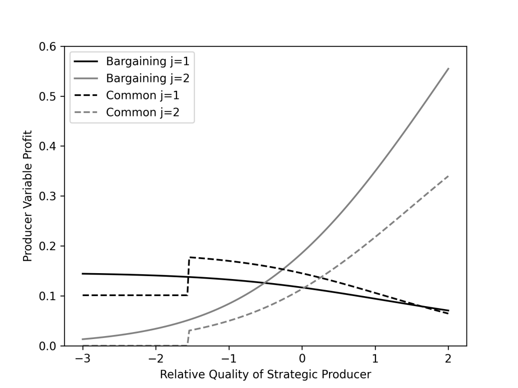


Toy Model: channels I

Profits of *fringe* producers can be higher if bargaining leads to entry + market expansion

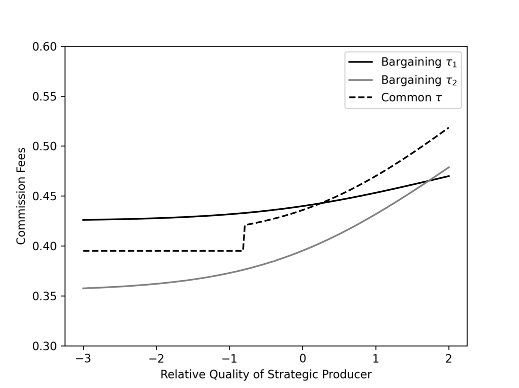


(a) $M = 1, C = 0.03$

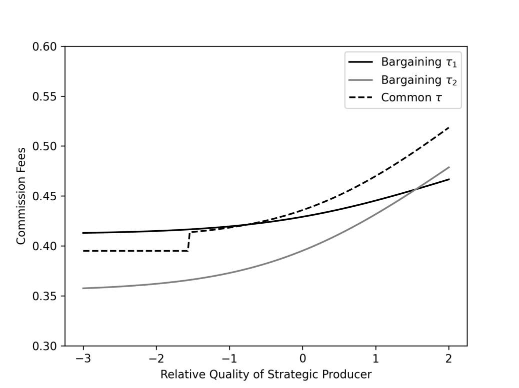


(b) $M = 2, C = 0.03$

Bargaining contracts may *lower* fees and lead to *cross-subsidization* if anchor is of high quality



(a) $M = 1$, $C = 0.03$



(b) $M = 2$, $C = 0.03$

Toy Model: recap

Offering *bargaining* contracts over (τ, r) has *ambiguous* consequences for *consumer welfare* and *fringe producer surplus*. Model parameters matter:

- Relative **quality** of producers δ_1 vs. δ_2.
- Market **expansion** effects M.
- **Entry** costs of anchor producers C, and bargaining weights β.
- Demand **distortions** due to **rankings** λ and **pricing** α.

$\Rightarrow$ Whether to allow preferencing and bargaining contracts is therefore an **empirical question!**

Next

1. Show evidence of positive spillovers due to market entry.
2. Develop a structural model of the platform to quantity the welfare losses/gains in our empirical context.

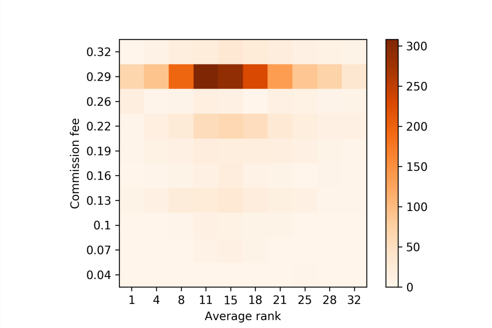
Empirical facts

Overview

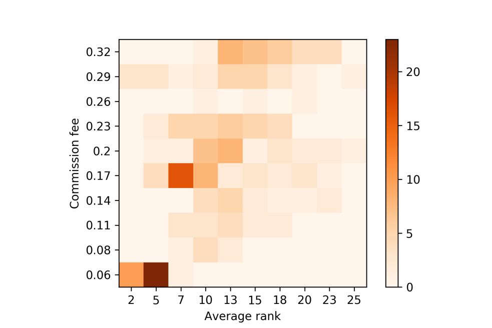
1. Design space $(\boldsymbol{\tau}, \bar{r})$.
2. Value of search preferencing.
3. Causal effect of rank.
4. Role of commission fees.
5. Importance of attracting producers.

The design space $(\tau, \bar{r})$

- For a sample including 1M orders from 2813 stores across 4 cities in early 2023.
- 221 stores have an "*is fixed*" contract.
- corr(τ_j, r_{ij}): -0.03 for not fixed vs. 0.23 for fixed.

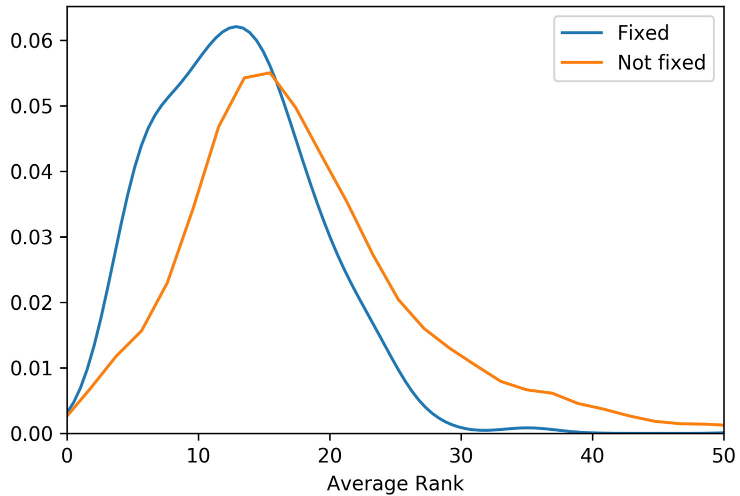


(a) Not fixed



(b) Fixed

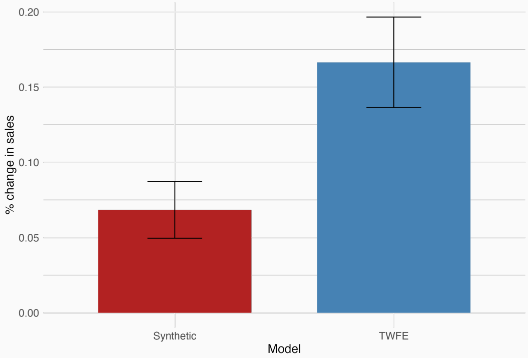
Search preferenced stores have lower $\bar{r}$



The value of search preferencing

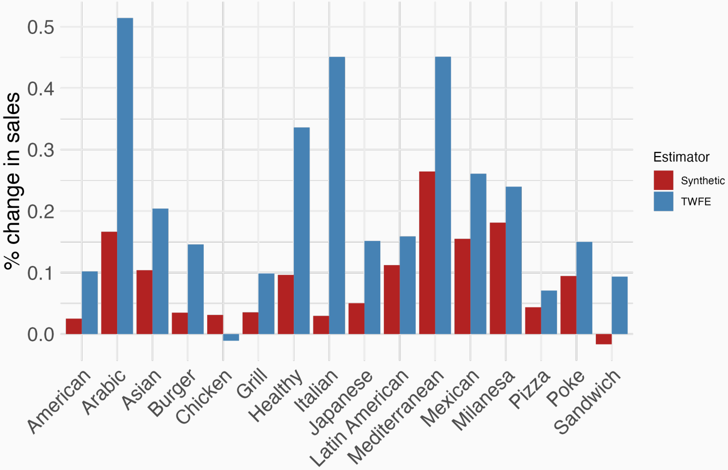
- Exploiting new fixed contracts: compare TWFE and *Synthetic* approach.
- Using the 2023 sample and aggregating by store j-week t $\implies \sim 7\%$ more sales.

$$log(\text{Num Orders}_{jt}) = \beta \text{is\_fixed}_{jt} + \underbrace{\gamma_t + \delta_j}_{TWFE} + \underbrace{\lambda_t' \mu_j}_{\text{Synthetic}} + \epsilon_{jt}.$$



The value of search preferencing - heterogeneity

- Wide heterogeneity across restaurant type $\implies$ $0 - 27\% \uparrow$ in sales.
- *Synthetic* estimator (Gulek and Vives-i-Bastida 2024) uniformly reduces upward bias.



Effect of rank on purchases

- **Preferencing channel**: search costs matter, higher rank $\Longrightarrow$ more sales.
- We observe three types of ranking:
  1. Producer based (distance from consumer + producer characteristics).
  2. Personalized/consumer and producer based (uses past history of consumer).
  3. Random!
- **Endogeneity concern**: rank correlated with quality.

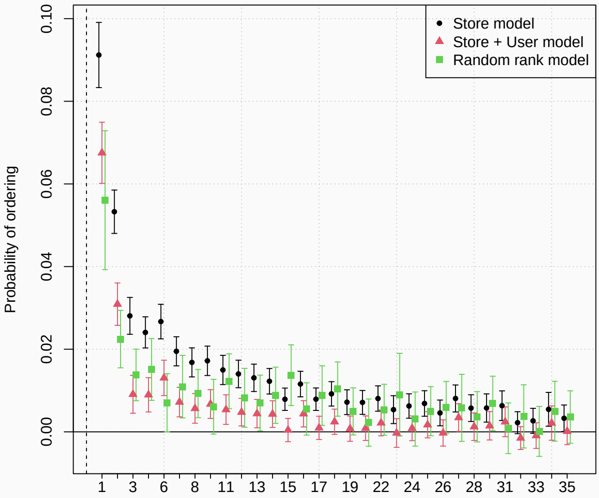
For each ranking type we use the sessions data for a sub sample to estimate a LPM:

$$Y_{ij} = \sum_{k=1}^{L} \gamma_k \mathbf{1}\{r_{ij} = k\} + X'_{ij}\beta + \epsilon_{ij}.$$

- $Y_{ij} \in \{0, 1\}$ depending on whether the consumer bought from that store.
- X_{ij} includes the characteristics the consumer saw: ETA, delivery fee, rating etc.
- We do this for the *Store Wall*, *Filters* and *Search*.

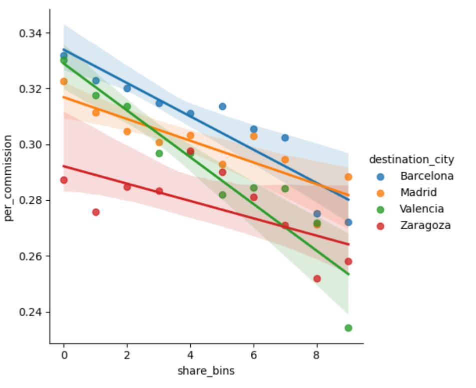
Effect of rank on purchases

- **Rank effect**: being 1st increases prob. of purchase 6% relative to >35 (avg. prob is 3%).

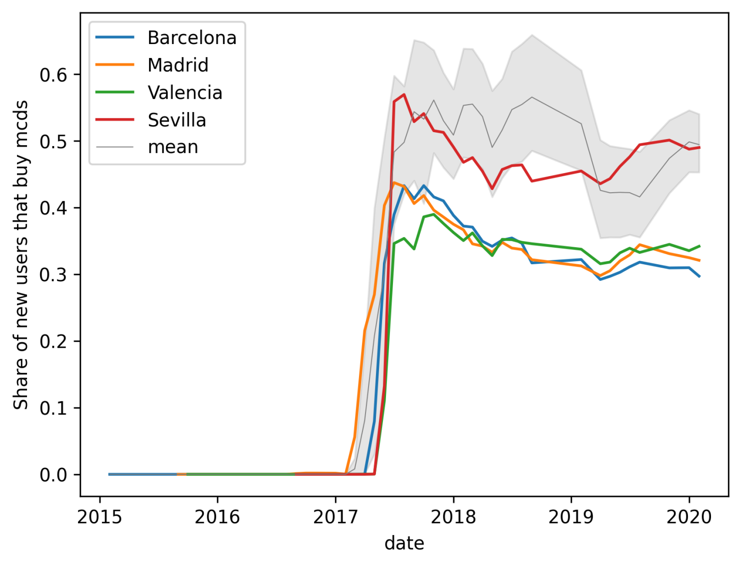


Restaurants with **lower commissions** have **larger market shares** (bargaining power).

- For strategic producers on average a **1% increase** in percent commission leads to a **0.1% increase** in average product price.

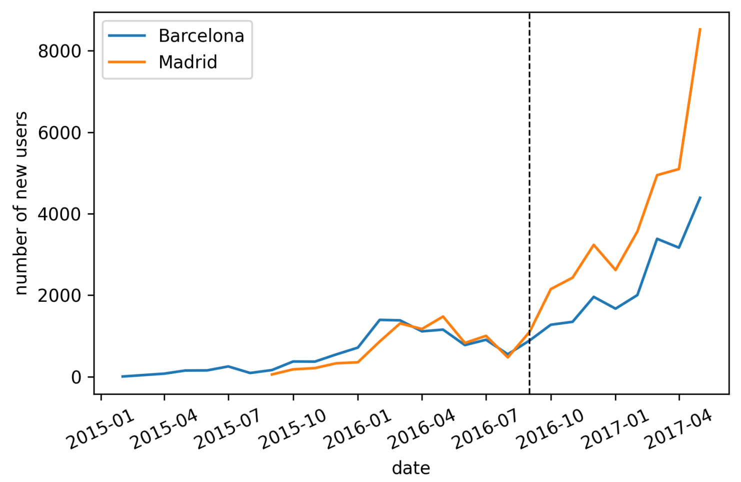


Importance of producer entry: McD case



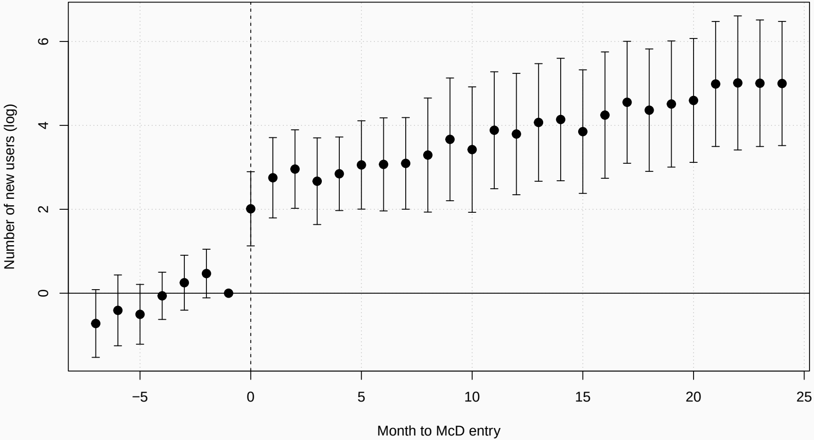
Anchor effect on user acquisition I

- Use timing of mcd entry across markets to see effect on entry.
- Control for TWFE and use Abraham and Sun 2020.



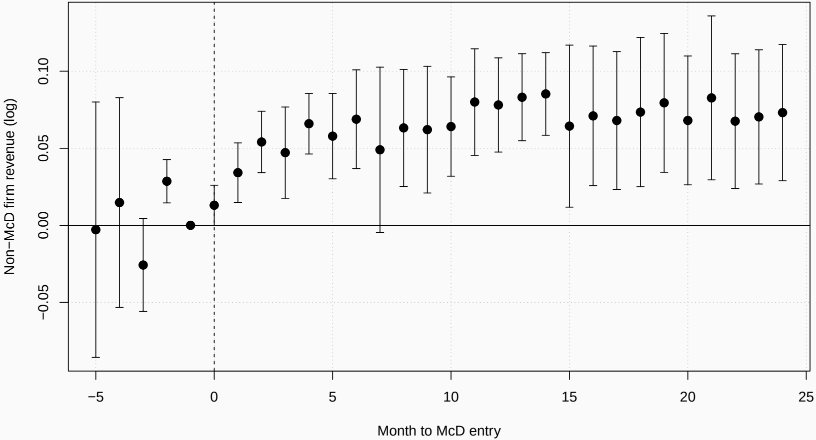
Anchor effect on user acquisition II

$log(N_{it}) = \alpha + \sum_{l=-k}^{k-1} \beta_l D_{it}^l + \gamma_i + \delta_t + \epsilon_{it}$, robust to different FE (city-year trends).



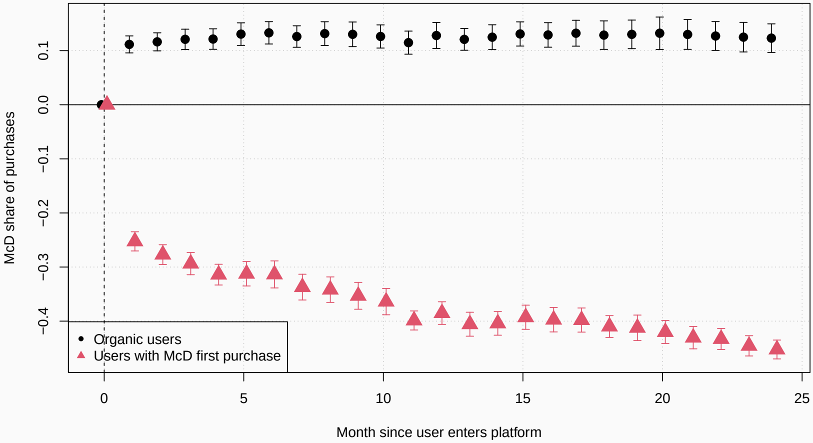
Anchor effect on competitors

$log(R_{kit}) = \alpha + \sum_{l=0}^{S} \beta_l D_{it}^{l} + \gamma_k + \delta_t + \epsilon_{jit}$, k is non-mcd restaurant, robust to other FE and controlling for number of stores.



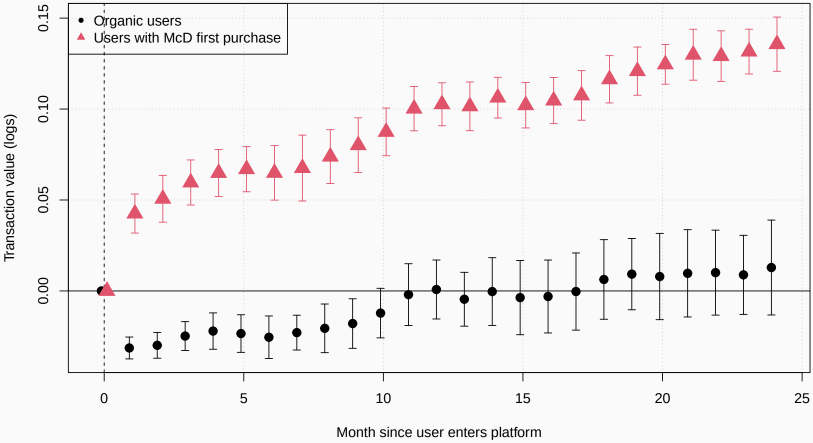
Spillover effects of user arrival I

$$log(distinct\_producer_{jit}) = \alpha + \sum_{l=0}^{k} \beta_l E^l_{jit} + \gamma_i \delta_{year_t} + \eta_j + \epsilon_{jit}, \text{ (}j\text{ consumer, }i\text{ city, }t\text{ month)}$$



Spillover effects of user arrival II

$$log(transaction\_value_{jit}) = \alpha + \sum_{l=0}^{k} \beta_l E^l_{jit} + \gamma_i \delta_{year_t} + \eta_j + \epsilon_{jit}, \text{ (} j \text{ consumer, } i \text{ city, } t \text{ month).}$$

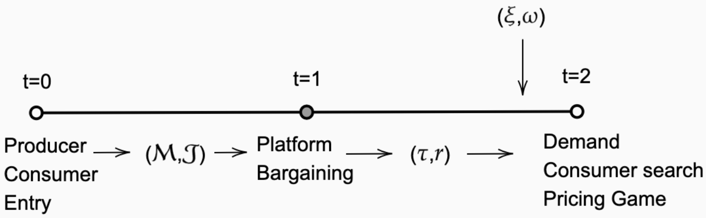


Recap

1. Search preferencing is **valuable**: $\uparrow$ rank, $\uparrow$ sales.
2. **Rank** has a $\uparrow$ effect on probability of purchase and which ranking system you use matters.
3. We can think of rank as being valuable in reducing **search costs**/time.
4. **Commission fees** are important in making the platform attractive to producers.
5. Lower commission fee restaurants have **larger market shares**, with small pass-through.
6. **On-boarding valuable producers** is key and can generate positive spillovers.

Model

Timing



- T=0: Consumers and firms choose platform entry.
- T=1: Given producer and consumer entry, producers and the platform bargain over commission fees and rankings.
- T=2: Demand and marginal cost shocks (ξ, ω) are realized, pricing and demand.

Consumption (T=2)

- **Market** z: encodes **city** z, at **month** t.
- **Good**: **order** (basket of products) from a restaurant.
- **Market structure**: $(\mathcal{M}_z, \mathcal{J}_z, \{\tau_{jz}\}, \{\bar{r}_{jz}\})$.
- **Agents**:
  1. **Consumers** that entered the market $\mathcal{M}_z$.
  2. **Producers** that entered the market $\mathcal{J}_z$.

Consumer i has **indirect utility** for product j in session l

$$\begin{aligned} u_{ijlz} &= \delta_{ijlz} + \varepsilon_{ijlz} \\ &= \alpha p_{jz} + \beta' X_{jz} + \gamma' Z_{ijlz} + \xi_{jz} + \varepsilon_{ijlz}, \end{aligned}$$

with u_0 denoting the outside option ("cooking dinner").

- X_{jz}: average rating, number of ratings, type of restaurant (japanese, pizza, burger)...
- p_{jz} is the average item price of producer j in market z.
- Z_{ijlz}: delivery fee, ETA.
- ε_{ijlz} are logit shocks.

Consumer Search/Consideration set formation (T=2)

- Rank affects the probability of a producer being included in the consideration set.
- We follow Goeree 2008 (ECMA) in modeling the consideration set formation.

Consumption probability given consideration set $C_{il} = \{C_{ilj}\}_{j=1}^{J}$:

$$p(C, \mathbf{X}, \mathbf{Z}) = P(Y_{ij} = 1 | C_{il} = C, \mathbf{X}, \mathbf{Z}) = \frac{e^{\delta_{ijz}}}{1 + \sum_{j' \in C} e^{\delta_{ij'z}}}.$$

Consideration set probability given consideration producer set $\mathcal{J}_z$:

$$P(\{\cap_j C_{ij}\} | \mathbf{X}, \mathbf{R}, \mathcal{J}) = \prod_j P(C_{ij} | \mathbf{X}, \mathbf{R}, \mathcal{J}) = \prod_j \Phi_{ij},$$

$$\Phi_{ij} = \frac{e^{\beta' X_{jz} + \gamma' Z_{ijlz} + \sum_{k=1}^{\bar{R}} \gamma_k \mathbf{1}(R_{ij} = k)}}{1 + e^{\beta' X_{jz} + \gamma' Z_{ijlz} + \sum_{k=1}^{\bar{R}} \gamma_k \mathbf{1}(R_{ij} = k)}}.$$

It follows that the **choice probability** for i (subsuming session l) is given by

$$p_{ij} = P(Y_{ij} = 1 | \mathbf{X}, \mathbf{Z}, \mathbf{R}, \mathcal{J}) = \sum_{C} \frac{e^{\delta_{ij}}}{1 + \sum_{j' \in C} e^{\delta_{ij'}}} \prod_{l \in C} \Phi_{il} \prod_{k \notin C} (1 - \Phi_{ik}),$$

Given that we observe the consideration sets, we estimate the parameters by minimizing the likelihood using the conditional probabilities

$$
\begin{aligned}
l(\{Y_{ij}\},\{C_i\};\boldsymbol{\theta}) &= \sum_{ij} Y_{ij} log(p(C_i, \{X_{ij}, Z_{ij}, R_{ij}\}_{j\in C_i})) \\
&= \sum_{ij} Y_{ij} log\left(\frac{e^{\delta_{ij}}}{1+\sum_{j'\in C_i} e^{\delta_{ij'}}}\right) + \sum_{ij} Y_{ij} log\left(\prod_{l\in C}\Phi_{il}\prod_{k\notin C}(1-\Phi_{ik})\right) \\
&= \underbrace{\sum_{ij} Y_{ij} log\left(\frac{e^{\delta_{ij}}}{1+\sum_{j'\in C_i} e^{\delta_{ij'}}}\right)}_{\text{Consumption}} + \underbrace{\sum_{ij} Y_{ij}\left(\sum_{k\in\mathcal{J}} C_{ik} log(\Phi_{ik}) + (1-C_{ik}) log(1-\Phi_{ik})\right)}_{\text{Consideration set}}
\end{aligned}
$$

- Instruments: Estimation through GMM by stacking the moments.

Preliminary Demand estimates I

- For a sample of 4 representative cities over.
- Caveat: pending SEs.
- Average **CS** is high (approx. 6 euros vs 22 euro average basket).
- More price sensitivity to the delivery fee.

ETA	p	fee	rating	N ratings	new	American	Italian	Gourmet
-0.0352	-0.164	-0.417	0.0993	-0.214	-0.0143	2.147	11.451	6.672

Table 1: $\epsilon_p = -0.904$, $\epsilon_{fee} = -1.52067$

ETA	fee	rating	N ratings	new	American	Italian	Gourmet
-0.0138	-0.0175	0.0235	0.00236	-0.172	0.0512	0.253	-0.227

Table 2: Consideration set model

Preliminary Demand estimates II

- Rank decay similar to reduced form.

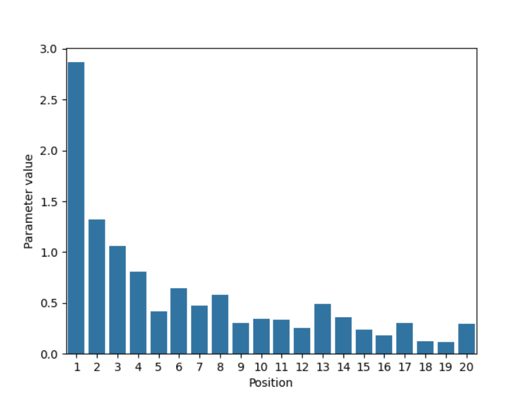


Figure 6: Position coefficients on consideration set probability.

A model for rank

- Rank contracts are complex and bargaining over specific positions complicates the bargaining model.
- An alternative, is to **model rank** explicitly.

We model the rank as a prediction problem:

$$R_{ij} = g(X_j, Z_{ij}).$$

Model g encodes different type of rankings:

1. Platform "**organic**" rank: train out of the box model $\hat{\mathbf{g}}$ using all X_{ijl} used in practice.
2. Rank model using only a subset of features (e.g. distance based).
3. **Quality rank** using only ξ_j.

Actual rank a user i faces is given by

$$r_i = H(g(X, Z), r_{is\_fixed})$$

where H substitutes the fixed ranks into the organic ranks.

Producers (T=2)

Producer demand is given by aggregating over *i*:

$$D_{jz} = \mathcal{M}_z \int p_{ij} dF_i$$

Restaurant **variable profits** in a given market is then

$$\pi_{jz} = (p_{jz}(1 - \tau_{jz}) - c_{jz})D_{jz}$$

- Fixed cost of entry in a market paid at $T = 0$.
- Marginal cost to sell in a market: c.
- Platform commission fee: τ.

Restaurant **costs**:

$$log(c_{jz}) = \kappa_z + a_j + \kappa' X_{jz} + \omega_{jz},$$

ω_{jz} cost shifter realized with ξ_{jz}.

Given market structure $(\mathcal{M}_z, \mathcal{J}_z, \{\tau_{jz}\}, \{\bar{r}_{jz}\})$ and realized (ξ, η).

Nash-Bertrand:

- Producers play pricing game in each market to

$$\max_{p} \pi_{jz}(p, \boldsymbol{p}_{-j}; \mathcal{M}_z, \mathcal{J}_z, \{\tau_{jz}\}, \{\bar{r}_{jz}\})$$

Markups given by FOC:

$$p_j = -\frac{D_j(p)}{\partial D_j(p)/\partial p_j} + \frac{c_j}{1-\tau_j}$$

- Iterate to find fixed point.

Platform operation profits in a market z given $\mathcal{M}_z$ and $\mathcal{J}_z$, and (ξ, ω) are

$$\Pi_z = \sum_{j \in \mathcal{J}_z} D_{jz}(p_{jz}\tau_{jz} + \text{fee}_z - \text{rider}_{jz}) - C^P_z,$$

- fee_{zt} is the average delivery fee paid for j
- rider_{jz} is the average payment to riders for the delivery for j
- C^P_{zt} is the cost of operating the platform in the market.

Platform objective function:

$$\Pi^P_{jz} = \Pi_{zt} + \kappa CS_{zt},$$

κ encodes the degree to which the platform cares about CS.

At $T = 1$ platform expected profits over demand and cost shocks:

$$\mathbb{E}_{(\xi,\omega)}[\Pi^P_z | \mathcal{M}_z, \mathcal{J}_z, \{\tau_{jz}\}, \{r_{jz}\}]$$

Platform bargaining (t=1)

Platform considers the following contracts for a producer in a market z

$$\{\tau_{jz}, r_{jz}\} \in \Gamma \times \mathcal{R}$$

The set of contracts available depends on the **type** of producer.

1. **Strategic/Big producers**: get different $\tau_j \in [0,1]$ and different $r_{jz}^{is\_fixed}$.
2. **Fringe producers**: common $\tau \in [0,1]$ and organic rank given by $r_{jz} = g$.

Fixed policies for "fringe" producers given bargained policies for strategic producers and organic ranking function g. For the set of fringe producers $\mathcal{K}$

$$\tau^* \in argmax_{\tau} \mathbb{E}_{(\xi,\omega)}[\Pi^P(\tau, \boldsymbol{\tau^*_{-\mathcal{K},z}}, \boldsymbol{r^*_z})|\mathcal{M}_z, \mathcal{J}_z)]$$

- The platform commits to an organic rank g before the game is played.
- Alternatively, the platform could choose between a menu of models $\mathcal{G}$ with $\hat{g}$ trained on different sets of features (distance, user histories etc).

Nash-in-Nash bargaining for “strategic” producers with joint surplus for producer $j \in \mathcal{K}^c$ given by

$$L_{jz} = \left(\mathbb{E}_{(\xi,\omega)}\left[\pi_{jz}(\tau, r, \boldsymbol{\tau^*_{-j,z}}, \boldsymbol{r^*_{-j,z}}) | \mathcal{M}_z, \mathcal{J}_z\right]\right)^{\beta_j} \cdot$$
$$\left(\mathbb{E}_{(\xi,\omega)}\left[\Pi^P(\tau, r, \boldsymbol{\tau^*_{-j,z}}, \boldsymbol{r^*_{-j,z}})) | \mathcal{M}_z, \mathcal{J}_z\right] - \mathbb{E}_{(\xi,\omega)}\left[\Pi^P(\tau, r, \boldsymbol{\tau^*_{-j,z}}, \boldsymbol{r^*_{-j,z}}) | \mathcal{M}_z, \mathcal{J}_z - \{j\}\right]\right)^{1-\beta_j}$$

Restaurant $(\tau_{jz}, \bar{r}_{jz})$ is determined by

$$(\tau^*_{jz}, \bar{r}^*_{jz}) \in argmax_{\tau,r} \quad L_j(\mathcal{M}_z, \mathcal{J}_z)$$

- Mixed integer program, but feasible to solve for a small number of strategic producers.
- Estimation following Ho and Lee 2017.

Consumer and Producer Entry (T=0)

Producers: Value of entering the bargaining step for j:

$$V_{jz}(\mathcal{J}_{-jz}, \mathcal{M}_z) = \mathbb{E}_{(\xi,\omega)}\left[\pi_{jz}(\boldsymbol{\tau}_z^*, \boldsymbol{r}_z^*)|\mathcal{M}_z, \mathcal{J}_{-jz}\right] - C_{jz}$$

Consumers: expected consumer surplus

$$B_{iz}(\mathcal{J}_z^*, \mathcal{M}_{-iz}^*) = \mathbb{E}_{(\xi,\omega)}\left[CS_{iz}(\boldsymbol{\tau}_z^*, \boldsymbol{r}_z^*)|\mathcal{M}_{-iz}, \mathcal{J}_{jz}\right] - G$$

Equilibrium Condition:

$$(\mathcal{J}_z, \mathcal{M}_z) \in \{(i,j) \text{ s.t. } B_{iz} \geq 0, V_{jz} \geq 0\}.$$

1. **Fringe producers** $j \in \mathcal{K}$ face a fixed cost $C_{jz} = C > 0$.
2. **Strategic producers** $k \in \mathcal{K}^c$ face different costs $C_{jz} > 0$.

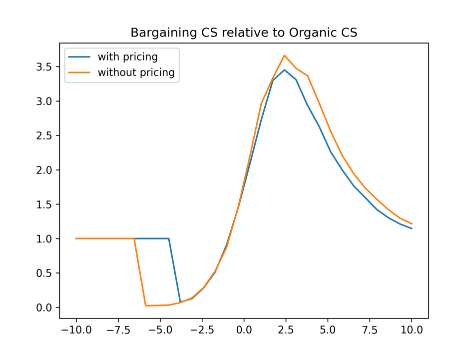
- Estimation is feasible by matching consumer shares between cities.
- What is the set of “potential” restaurants? Quality-type-city grid.

Simulations from structural model

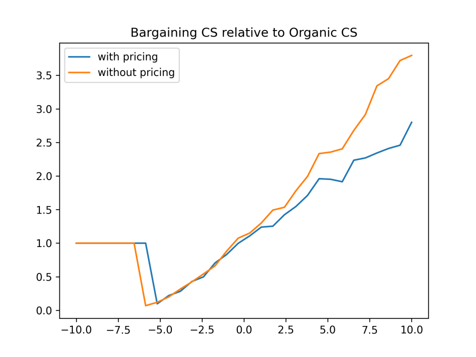
We do not have results from the supply side of the model yet. But, we simulate from a simplified version of the model to highlight several important points:

1. Bargaining for rank can ↑↓ CS depending on ξ and β.
2. Producer/Consumer entry key in explaining why platform sets lower τ.
3. Offering preferential contracts (τ, r) can ↑↓ CS depending on ξ and β.

- 2 producers: platform bargains with producer 2 over $r_2 \in \{1, 2\}$.
- "Organic rank" always ranks producer 1 first.
- Producer 2 quality is $\xi_1 + v$, for $v \in [-10, 10]$.
- Three regions: **low** (r_2=2), **middle** ($r_2 = 1$ bad), **high** ($r_1 = 1$ good).

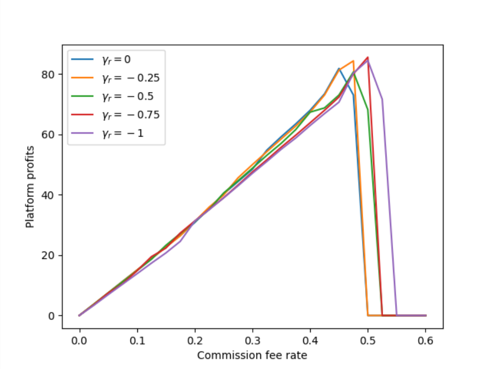


(a) ξ in Φ_{ij}

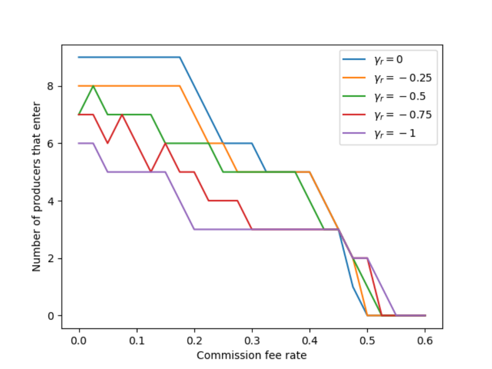


(b) ξ not in Φ_{ij}

- N=50 consumers, J=20 producers with entry costs.
- Demand model with linear rank parameter γ_r.
- Increasing the importance of rank allows the platform to extract more surplus in equilibrium.

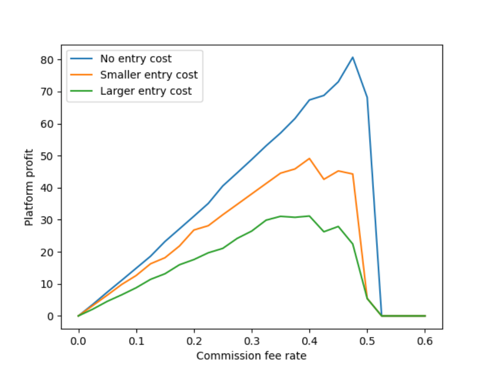


(a) Platform profits.

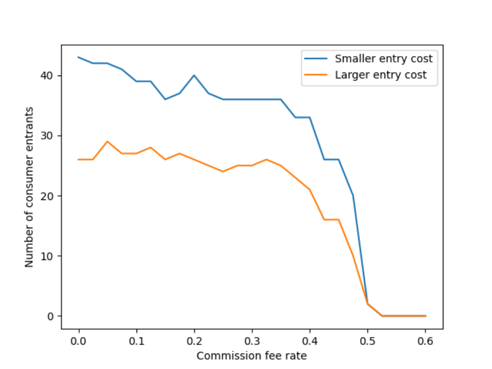


(b) Entrants

1. Adding consumer entry might explain why the platform may want to set lower commission fees.



(a) Platform profits.



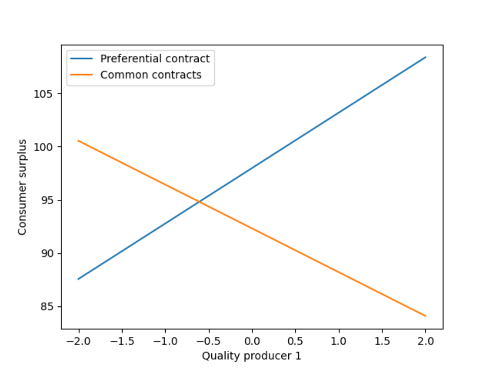
(b) Consumer entry

When is offering preferential contracts welfare improving?

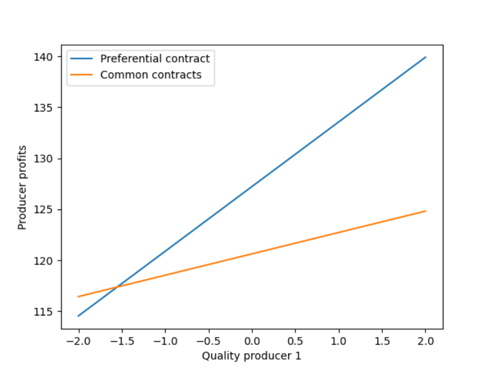
- Producer 1 is the strategic producer and has quality $\xi_1 \in \{-2, 2\}$, relative to the other producers that have $\xi_j = 0.5$.
- Producer 1 also faces a higher entry cost (outside option) to join the platform of $C_1 = 1$ vs. $C_j = 0.5$.
- Consumers face a fixed entry cost.
- The platform can offer two menus of contracts. In both cases producer 1 is offered the top spot.
  1. **Fixed contract**: all producers get the same commission rate τ and rankings are given by j.
  2. **Preferential contract**: producer 1 and platform bargain for τ_1 and all other producers get a fixed fee τ. Rankings are given by j.
- We simulate demand and find the optimal τ and τ_1 for each set of contracts for the different qualities $\xi_1 \in \{-2, 2\}$.

Simulations

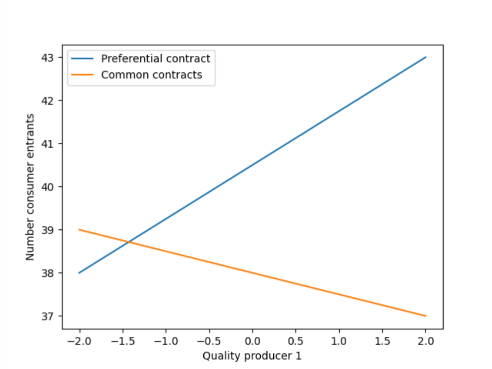
- **Low quality case**:
  1. Fixed contract: $\tau_j = 0.27$, producer does **not enter**.
  2. Preferential contract: **(**$\tau_1 = 0.07, \tau_j = 0.28$**)**, producer one does **enter**.
  3. Preferential contract *lowers* CS, less entry etc.
- **High quality case**:
  1. Fixed contract: $\tau_j = 0.25$, producer does **enter**.
  2. Preferential contract: ($\tau_1 = 0.33, \tau_j = 0.23$), producer one does **enter**.
  3. Preferential contract *increases* CS, more entry due to cross subsidization.



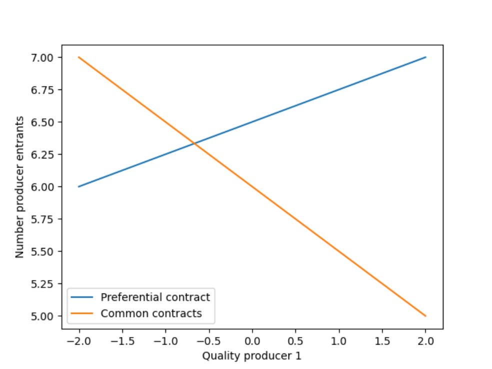
(a) Consumer surplus



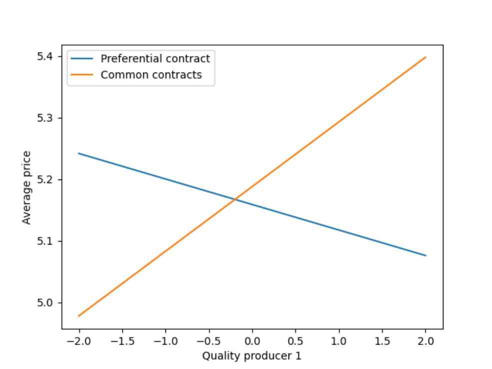
(b) Producer profits



(a) Consumer entrants



(b) Producer entry


Preferential contract
Common contracts
5.4
5.3
5.2
5.1
5.0
Average price
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0
Quality producer 1

(a) Prices

1. Shut down bargaining: all restaurant get **fixed policy**.
    1.1 Different ranking schemes.
2. Shut down bargaining partially:
    2.1 Only bargaining on **commission fees**.
    2.2 Only bargaining on **average ranks**.
3. Platform only cares about CS: $\kappa \to \infty$.
4. Platform does not care about CS: $\kappa \to 0$.
5. Ban a big producer from the platform:
    - Pro or anti-competitive effects?

Outcomes of the counterfactuals:

1. Equilibrium CS.
2. Equilibrium quality-type of restaurants that enter.
3. Equilibrium market structure
4. Equilibrium markups (if we solve for prices).
5. Equilibrium welfare decomposition.

Conclusion

In this project we have shown that

1. Platforms **commission fees** and **rankings** shape within platform demand.
2. Platforms may use preferential contracts to attract valuable *anchor* producers.
3. The **welfare** implications of offering preferential contracts are *ambiguous* and depend on the empirical setting.
4. Quantifying welfare through a structural model is key to understanding **optimal policy**.

Next steps:

1. Solve supply side of the structural model and estimate entry parameters.
2. Generate counterfactuals.

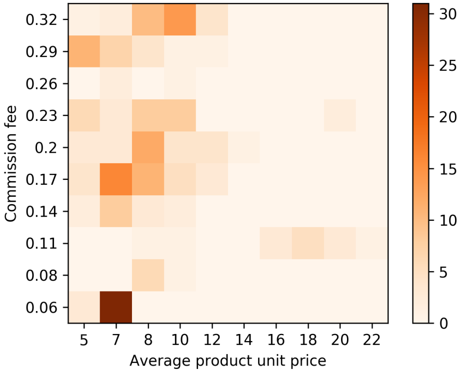
Additional slides

Literature

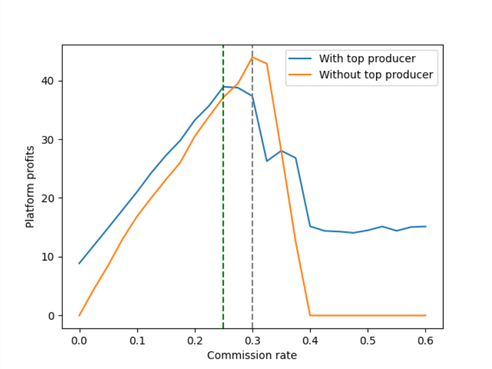
1. **Bargaining/exclusivity/vertical integration**: Crawford and Yurukoglu (2012), Crawford et al. (2018), Ho and Lee (2019), Lee (2013), Lee and Fong (2013), Collar-Wexler et al. (2019)
2. **Platform pricing**: Sullivan 2023, Argentesi and Filistrucchi (2007), Ho and Lee (2017), and Jin and Rysman (2015)
3. **Search/Design** platform: Dinerstein et al. (2018), Lee and Musolff (2023), Aguiar and Waldfogel (2018), Reimers and Waldfogel (2023), Honka and Chintagunta (2013).
4. **Welfare** in platforms: Castillo (2022), Calder-Wang (2022), Schaefer and Tran (2020), and Farronato and Fradkin (2022), Gutierrez (2022)
5. **Multisided markets:** Rochet and Tirole 2003, Farrell and Klemperer 2007, Weyl 2010, Tan and Zhou 2020

Pass-through? Maybe

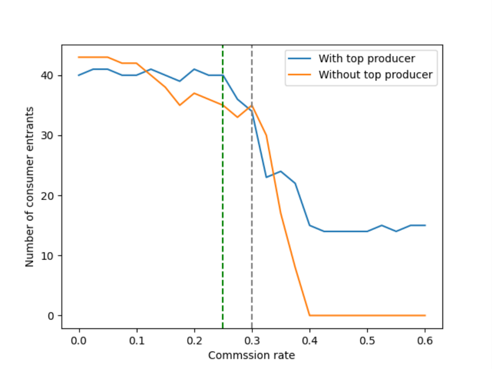
- For strategic producers on average a **1% increase** in percent commission leads to a **0.1% increase** in average product price.
- Heterogeneity might matter a lot.



- Including a top producer (at a lower commission) can yield lower commissions, more entrants, higher CS and higher producer surplus.

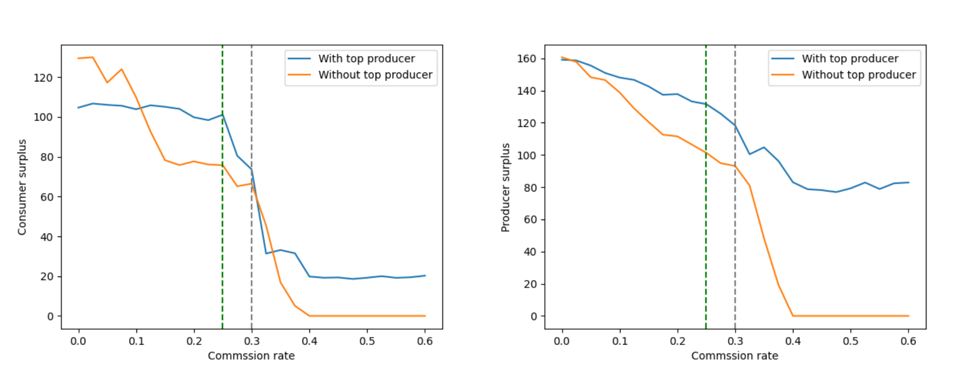


(a) Platform profits.



(b) Consumer entry

Simulations: importance of top producers



(a) Consumer surplus

(b) Producer surplus