Discussion on "**Merger Analysis in the App Economy: An Empirical Model fo Ad-Sponsored Media**"

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Summary

- RQ1. How to define a relevant market in the app economy?
  - The traditional market definition approach for horizontal merger analysis consists of four steps: (1) define market; (2) calculate HHI and change in HHI; (3) evaluate other factors; (4) consider pro-competitive justification
  - The traditional test for (1) is the “Small but Significant and Non-transitionary Increase in Price” (SSNIP) test
  - But many apps are free.
  - This paper uses SSNIC where “cost” is ad intensity
- RQ2. What is the welfare effect of a merger where the developer of a top app in a category acquires other top apps?
- RQ3. What happens when platform transaction fee is reduced?

Antitrust in Two-Side Markets

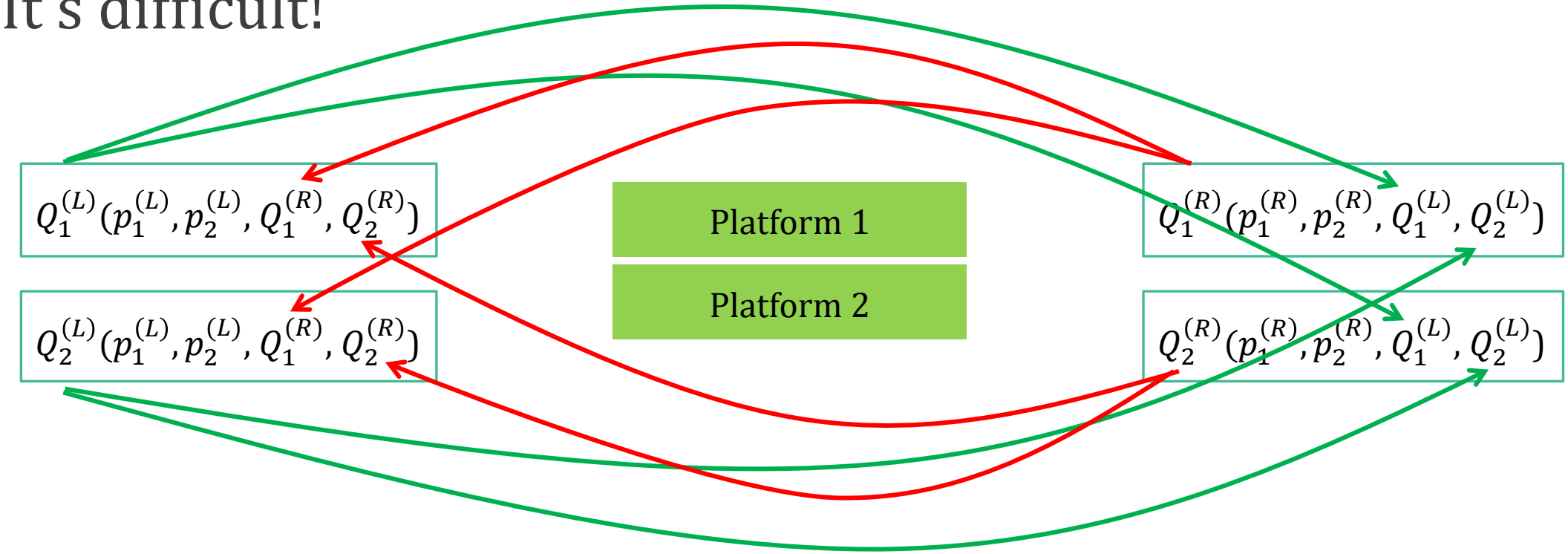
Example: the Amex 2018 case

- "The plaintiffs have not carried their burden to show anticompetitive effects. Their argument—that Amex's anti-steering provisions increase merchant fees—wrongly focuses on just one side of the market. Evidence of a price increase on one side of a two-sided transaction platform cannot, by itself, demonstrate an anticompetitive exercise of market power."
- "courts must include both sides of the platform—merchants and cardholders—when defining the credit-card market."

Suprecourt (slip opinion) OHIO ET AL. v. AMERICAN EXPRESS CO. ET AL, https://www.supremecourt.gov/opinions/17pdf/16-1454_5h26.pdf

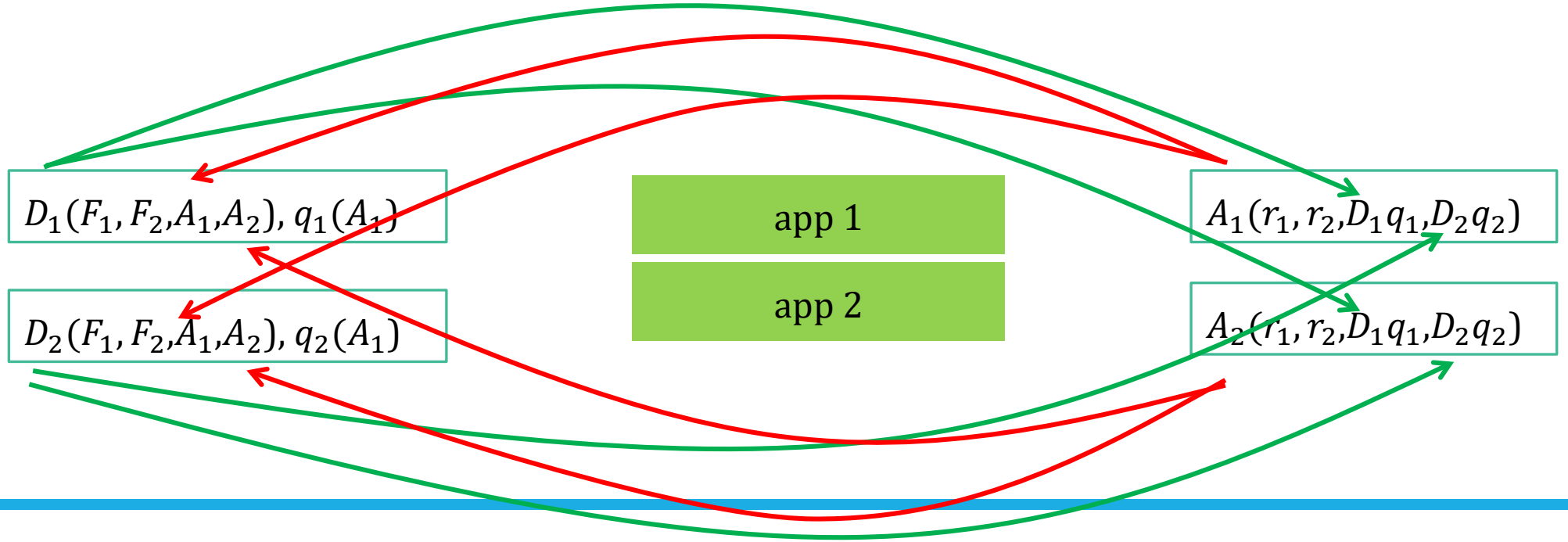
Antitrust in Two-Side Markets

It's difficult!



In the Context of the App Market

	Consumers	Demand	Price
"Left Side"	Users	Download (D_j), Usage (q_j)	Fee (F_j)
"Right Side"	Advertisers	Advertisement (A_j)	Ad rate (r_j)



This Paper

"Transform the original model of competition in advertising intensity and prices into an equivalent competition-in-utility model"

What's the Magic?

Ignore mc and platform royalty

for simplicity

$$F_j \cdot D_j(F_1, F_2, A_1, A_2) + r_j \cdot A_j\ (r_1, r_2, D_1 q_1, D_2 q_2)$$

What's the Magic?

A_j linear in $D_j q_j$, a_j=ad intensity
Change of var: choose a_j instead of r_j

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$$F_j \cdot D_j(F_1, F_2, a_1, a_2) + r_j(a_1, a_2) \cdot a_j D_j(F_1, F_2, a_1, a_2)\ q_j(a_j)$$

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No direct competition for advertisers:
$r_j = r$

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$$f(\delta_j, a_j) \cdot D_j(\delta_1, \delta_2) + r \cdot a_j D_j(\delta_1, \delta_2)\ q_j(a_j)$$

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A_j linear in $D_j q_j$, a_j=ad intensity
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$$f(\delta_j, a_j^*(\delta_j)) \cdot D_j(\delta_1, \delta_2) + r \cdot a_j^*(\delta_j) D_j(\delta_1, \delta_2)\ q_j(a_j^*(\delta_j))$$

Assumptions

(1) No direct competition on one side

- No direct competition for advertisers
  - exogenous and common advertising rate, $r_j = r$: this paper
  - "monopoly" advertising market, $r_j = r_j(a_j)$: Rysman (2004) and Fan (2013)
- Not a "real" two-sided market
  - Not a criticism!!

(2) Fee and ad intensity affect demand through a summary stat, i.e., mean utility

Estimation Challenges (1): Unobservable a_j

Identification of how ad intensity (a_j) affects utility (i.e., coef. α_a)

- Ad intensity (a_j) is unobservable
- Plug the optimal a_j according to the model, i.e., $a_j(X_j, r)$, in the utility function $u_{ij}(F_j, a_j, X_j)$
- How to separate the effect of a_j and the effect of X_j?
  - Functional form?
  - Variation in r? (only time variation)

Estimation Challenges (2): Zero Fees

Consider the following constrained profit-maximization problem:

$$\max_{(p_1,p_2,p_3)} \sum_{j=1,2,3}(p_j - c_j)Q_j(p_1,p_2,p_3) \quad \text{s.t.} \quad p_j \geq 0$$

Data: $p_1 > 0, p_2 = 0, p_3 = 0$

F.O.C.: $$Q_1 + \frac{\partial Q_1}{\partial p_1}(p_1 - c_1) + \frac{\partial Q_2}{\partial p_1}(p_2 - c_2) + \frac{\partial Q_3}{\partial p_1}(p_3 - c_3) = 0$$

$$Q_2 + \frac{\partial Q_1}{\partial p_2}(p_1 - c_1) + \frac{\partial Q_2}{\partial p_2}(p_2 - c_2) + \frac{\partial Q_3}{\partial p_2}(p_3 - c_3) \leq 0$$

$$Q_3 + \frac{\partial Q_1}{\partial p_2}(p_1 - c_1) + \frac{\partial Q_2}{\partial p_2}(p_2 - c_2) + \frac{\partial Q_3}{\partial p_2}(p_3 - c_3) \leq 0$$

Estimation Challenges (2): Zero Fees (Cont.)

From $Q + \frac{\partial Q}{\partial p}(p - c) \leq 0$,

- We cannot back out c_j due to inequalities
- We cannot obtain bounds such as $c_j \geq *$ or $c_j \leq *$ even with one equality due to the multi-product nature of the firm

Estimation Challenges (2): Zero Fees (Cont.)

Dubois and Lasio (2018)

- A product is sold in both unconstrained markets (without price ceilings) and constrained markets (with price ceilings)
- Estimate the Lagrangian multipliers together with the marginal cost parameters using the variation across such markets

Fan and Zhang (2021)

- Unbinding for all products of some firms --> identify mc parameters and distribution of the unobservable shock ("point identified")
- Draw the unobservable shock for other observations ("set identified")

Demand Estimation

- Estimating the substitution pattern is important for defining the market and the merger analysis
  - Price is very often zero. The true cost of using an app is the ad intensity
  - Maybe allow for consumer heterogeneity in the ad intensity (and yet maintaining the assumption that the fee and the ad intensity enters the utility function through one summary statistics)?
- It would be helpful to present diversion ratios

Overall

- A comprehensive study of the app market
- The framework is potentially useful for other studies in the market or similar markets
- Contributes to the rising literature on digital economy
  - Guy Aridor, Columbia, field experiment to study the relevant market in the app economy
  - **Xuan Teng**, Michigan, study preferential search ranking and its consequences in the Apple app market