Discussion of "Digital Advertising and Market Structure" by Deisenroth, Manjeer, Sohail, Tadelis & **Niels Wernerfelt**

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Summary

- **Setting** : Privacy concerns: A natural experiment: introduction (April 21) of a privacy feature in Apple (ATT!) and their impact on users and platforms.
- Very rich data sources from Facebook and Instagram as well as administrative data
- **Parameter(s) of interest:** What if users are offered the possibility of limiting access to their data? Outcomes: advertisement volume, market structure & prices.
- **Main assumptions**: Parallel trend assumption + exogeneity of the treatment variable

Contribution 1: Economic model

Decrease in effectiveness of advertisement (Z private) :

$$\Pr(Purchase \mid Advertising, Z) \neq \Pr(Purchase \mid Advertising)$$

Under plausible conditions:

- Firms exit market (e.g. the advertising market on Facebook and Instagram!)
- Advertisement volumes decrease
- Prices increase

Question: Pure technological shock on advertisement, what about the reactions of the platform to this shock? Prices in particular?

Contribution 2: Matching internal/external data

- Data on advertising from internal sources: advertising, number of firms
- Data on prices from administrative sources: prices, number of firms

Careful matching of the two (multiple matching, checking expost by randomization, ...)
Question: Yet, some firms might not advertise on Facebook, Instagram : final goods/intermediate goods? small/large firms?.
Check that common variables (e.g. number of firms) in internal/external sources react in the same way to treatment?

Contribution 3: Treatment effects

The structure of the natural experiment without any other assumptions leads to a before/after estimate whose quality is low since time is a confounder.

Idea: Use a variable, X_i, (say exposure to treatment), at the industry level. Construct the treatment group $(D_i = 1)$ as industries such that $X_i \geq 90\% Percentile$ of its distribution and the control group $(D_i = 0)$ as industries with $X_i \leq 10\% Percentile$. Compute the means over time in these two groups between 2020Q2 to 2023Q3 and adopt a difference in differences estimation procedure (i is industry specific).

$$Y_{it} = \delta_t + \gamma_i + \beta D_i * \mid t - 2021Q2 \mid + \varepsilon_{it}.$$

Remark: to avoid simultaneity of outcomes and treatment, use information on X that predates the date of the switch

Issues

- **Parallel trend assumption**: the estimates are Average Treatment on the Treated (ATT!) estimates if trends are the same in treated & control groups *in the absence of the treatment*. In other words, the treatment is exogenous to the "long" differenced outcomes, $Y_{it} - Y_{i2021Q2} \perp D_i$.
- **Endogeneity of exposure to treatment**: some unobserved heterogeneity affect treatment, $Y_{it} - Y_{i2021Q2}$ correlated with X_i
- **Reference level**: the impact of the experiment on outcomes is not 0 even for the control group. How do we interpret the estimate?
- **Continuous treatment with DiD:** See Callaway, Goodman-Bacon & Sant'Anna, WP NBER, 2024.