Have I seen you before?
Measuring the value of tracking for digital advertising

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Consumer tracking in the digital world is made harder by privacy regulations

✓ Privacy regulations are introduced more and more:

- Private regulation:
  The App Tracking Transparency policy of Apple on iOS14.5 and above will prevent consumer tracking across apps without explicit consent.

✓ Hard to find the right balance between protecting consumer and supporting qualitative internet services

- Trade-off for consumers between privacy and excessive ill-fitted advertising.
- Trade-off for consumers also between privacy and WTP for services.
- Lack of data on the impact of privacy regulations on the revenues and profitability of firms

✓ We contribute to understanding the impact of privacy regulations on advertising outcomes:

- We measure empirically the effect of stricter privacy rules on **targeting efficiency** and **ad prices** on Facebook.
- We use the **introduction of iOS 14.5 as a natural experiment** and compare the outcomes of ads targeting iOS users vs. ads targeting Android users.

What do we expect in theory?

✓ A negative effect on targeting efficiency:

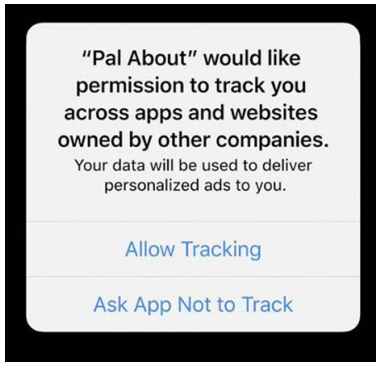
- The difficulty to aggregate data should make consumers harder to identify.

✓ Several effects can be at play for prices:

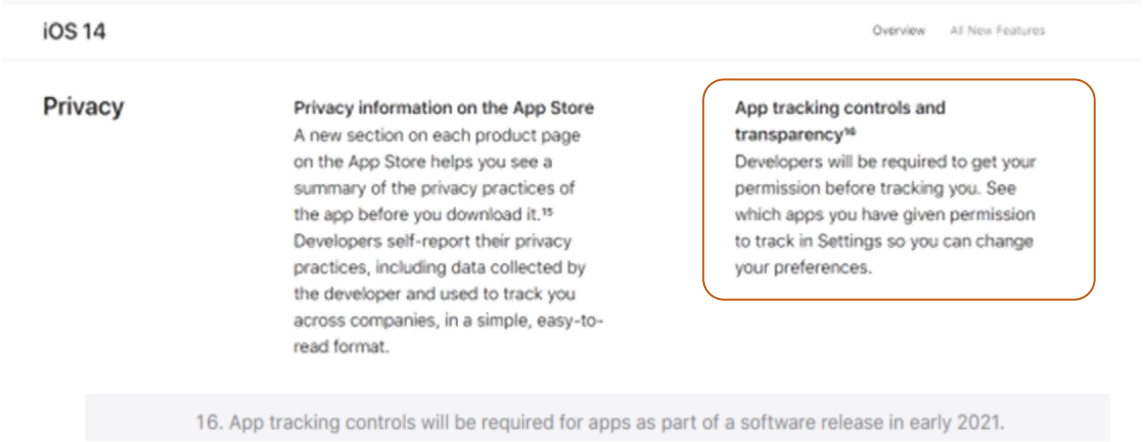
- Higher 'cost' to reach a consumer ➔ higher price
- Readjustment of the quality-adjusted price ➔ lower price
- Competitive advantage for one or the other ad network ➔ higher or lower price

The App Tracking Transparency Scheme

- Introduction of new privacy rules on April 26th, 2021
- Introduced on the iOS 14.5 and later versions (iOS 14.5+).
- Description: Apps need to display a message to ask users for their permission before tracking them.



https://www.apple.com/ios/ios-14/features/



We use Facebook Delivery Estimate Data

- Facebook Delivery Estimate Data (through Facebook Marketing API):
  - We made **daily requests** for more than **700 different target audiences**, between March 11th and July 11th.
  - We get estimated **impressions**, **reach** and **actions** curves, with respect to daily budgets + the daily audience size (DAU=Daily Average Users)
  - We compute impressions and actions for a daily budget of 100€ to be able to compare delivery estimates across audiences.

- We use the data to compute two main indicators:

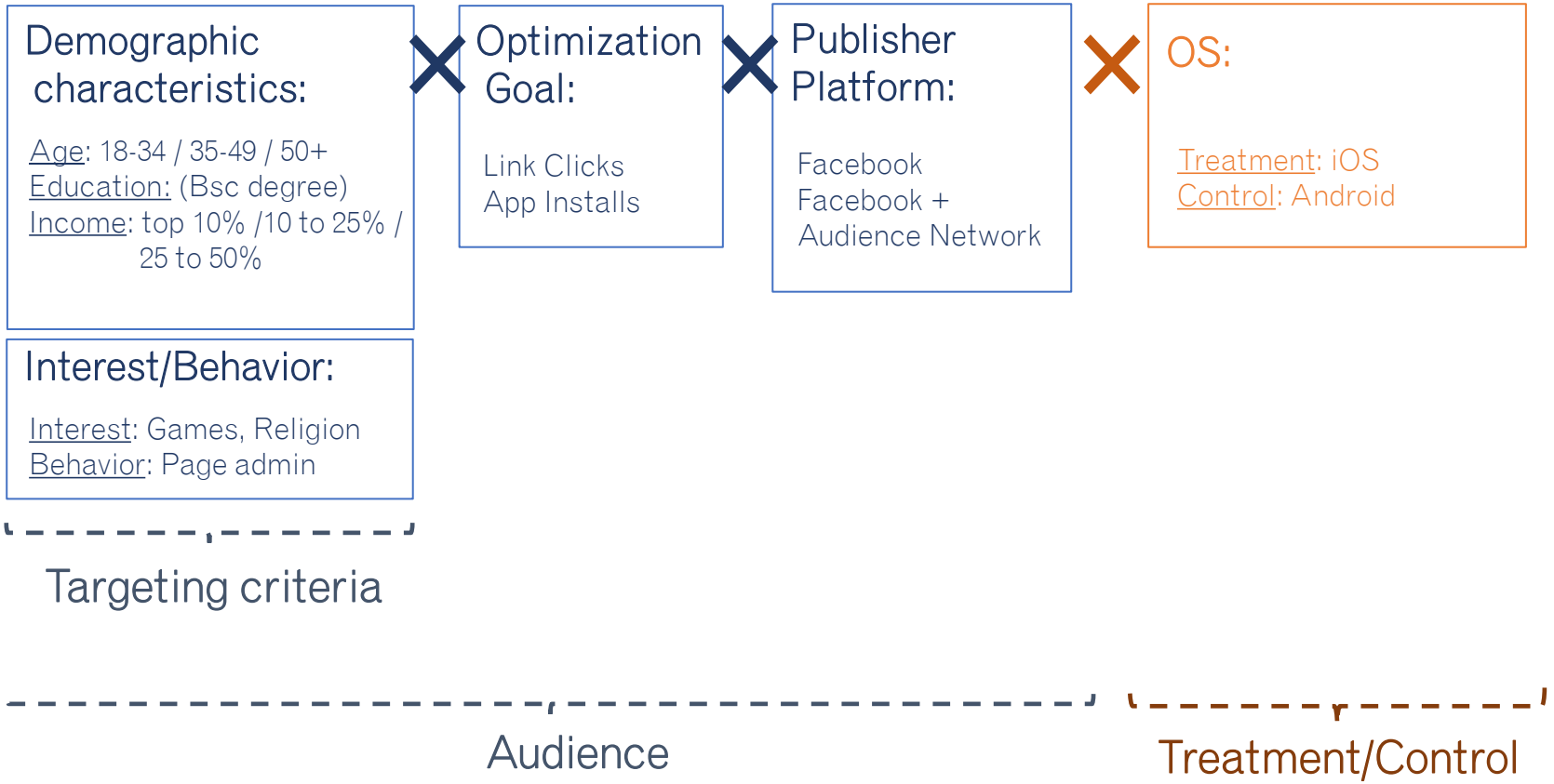
CR = Conversion Rate (in %)
The probability that an impression will generate an action by the consumer

➔ Proxy for targeting efficiency/ ad effectiveness

CPM = Cost-per-Mille
The price charged for a 1,000 impressions

➔ Proxy for ad price

Each observation is structured as follows



We use a difference-in-differences design

✓ In the baseline specification, we use:

$$\mathbf{y_{oat}} = \alpha_{oat} + \mathbb{1}_{\text{After}} + \mathbb{1}_{\text{iOS}} + \delta(\mathbb{1}_{\text{iOS}} \times \mathbb{1}_{\text{After}}) + \epsilon_{oat}$$

- Where *o* stands for OS, *a* for audience, and *t* for time.
- We cluster standard errors at the audience level.

✓ In a second specification we add:

- Time fixed-effect
- Audience fixed-effect
- Hour fixed-effect
- Control on the size of the audience: *log(DAU)* .

✓ We let some lag between the *Before* and *After* periods:

- Before April, 26th
- After May, 12th

A decrease in targeting efficiency as well as in the price of ads

Table 2: Treatment effect on CR and CPM

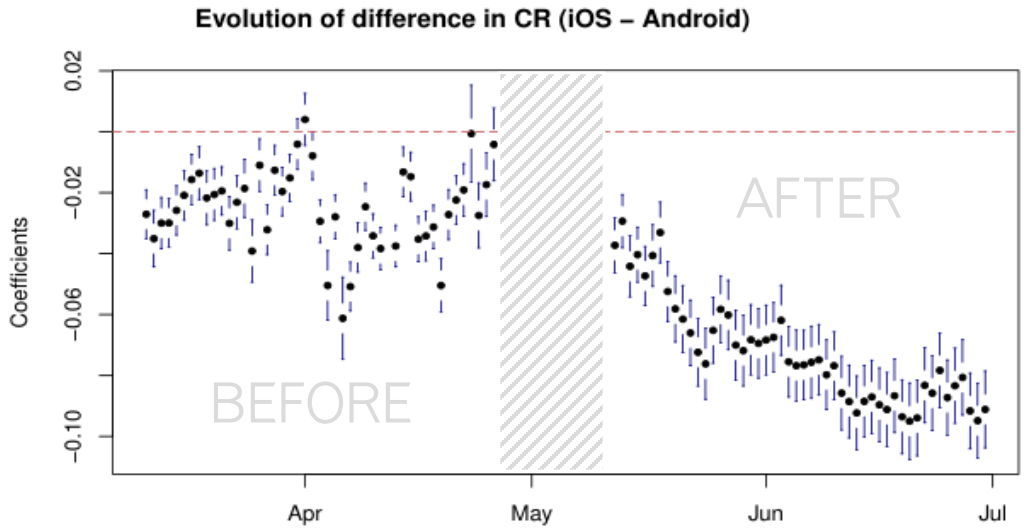
	Dependent variable:			
	CR (in %)		CPM (in €)	
	(1)	(2)	(3)	(4)
DiD	−0.051*** (−0.059, −0.043)	−0.051*** (−0.059, −0.043)	−0.543*** (−0.578, −0.508)	−0.542*** (−0.577, −0.507)
Audience FE	No	Yes	No	Yes
Date FE	No	Yes	No	Yes
Hour FE	No	Yes	No	Yes
log(DAU) Control	No	Yes	No	Yes
Mean iOS before	0.665	0.665	5.106	5.106
Observations	211,342	211,342	211,342	211,342
Adjusted R^2	0.026	0.887	0.014	0.943
Residual Std. Error	0.345	0.118	2.106	0.506

Note: *p<0.1; **p<0.05; ***p<0.01
The standard errors are clustered by audience.
Treatment group: facebook access iOS device.
Control group: facebook access Android device.

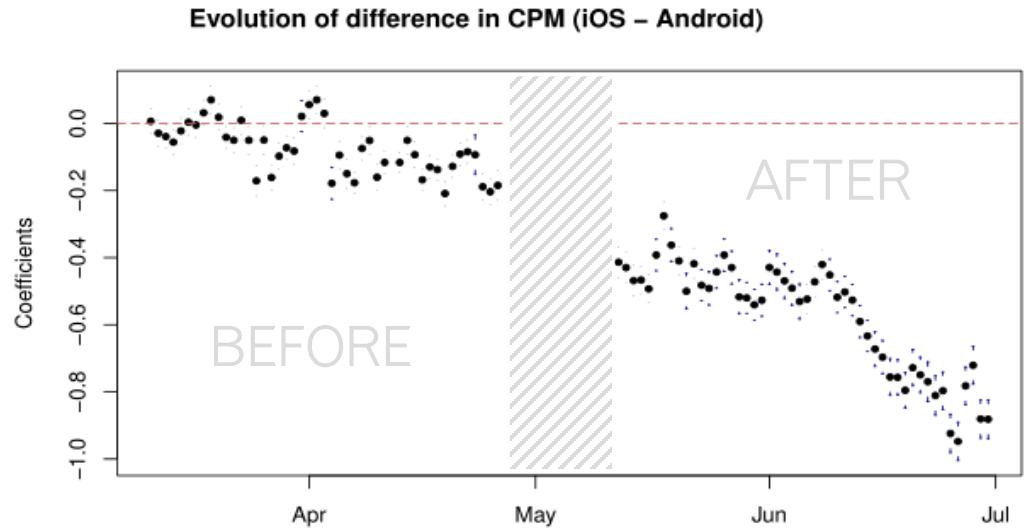
Reminder:
- CR = Conversion Rate
- CPM = Cost Per Mille

This corresponds to a **decrease of about 8%** in targeting efficiency and a **decrease of about 10%** in the price of ads, when comparing to means on iOS before the change.

The decrease seems to get stronger with increased adoption of the iOS14.5+



- ✓ Coefficients of the regression of the difference in quality ($CR_{a,t}^{iOS} - CR_{a,t}^{Android}$) on time .



- ✓ Coefficients of the regression of the difference in prices ($CPM_{a,t}^{iOS} - CPM_{a,t}^{Android}$) on time.

Is the impact stronger on more refined audiences?

Table 4: Targeting precision and treatment effect on CR and CPM

	Dependent variable:	
	CR	CPM
	(1)	(2)
DiD	0.189***	−0.363***
	(0.099, 0.278)	(−0.527, −0.200)
DiD*2-criteria	−0.150***	−0.113
	(−0.243, −0.058)	(−0.285, 0.060)
DiD*3-criteria	−0.233***	−0.166**
	(−0.323, −0.142)	(−0.332, −0.001)
DiD*4-criteria	−0.253***	−0.169**
	(−0.344, −0.163)	(−0.333, −0.004)
DiD*5-criteria	−0.274***	−0.259***
	(−0.364, −0.184)	(−0.431, −0.086)
Audience FE	Yes	Yes
Date FE	Yes	Yes
DAU Control	Yes	Yes
Observations	211,342	211,342
R^2	0.890	0.941
Adjusted R^2	0.889	0.941
Residual Std. Error	0.116	0.516

Note: *p<0.1; **p<0.05; ***p<0.01
The standard errors are clustered by audiences.

- ✓ For **audiences which are harder to identify** and require more data, the change in privacy policy has **a stronger effect** on Facebook's targeting efficiency and on ad prices.

Is the impact stronger for an action harder to trigger ?

Table 7: Differentiated Effect of ATT on optimization goals

	Dependent variable:	
	CR	CPM
	(1)	(2)
DiD	−0.004	−0.509***
	(−0.014, 0.006)	(−0.552, −0.467)
DiD*App Install	−0.095***	−0.066**
	(−0.106, −0.084)	(−0.117, −0.015)
Audience FE	Yes	Yes
Date FE	Yes	Yes
Hour FE	Yes	Yes
log(DAU) Control	Yes	Yes
Mean iOS before	0.665	5.106
Observations	211,342	211,342
Adjusted R^2	0.902	0.943
Residual Std. Error	0.109	0.506

Note: *p<0.1; **p<0.05; ***p<0.01

The standard errors are clustered by audiences.

- ✓ We compare the effect when the goal is App Install instead of link clicks
- ✓ The introduction of the ATT has **a stronger effect** on Facebook's targeting efficiency and on ad prices for **actions which are harder to trigger** and may require more data, .

Conclusion

✓ Our results suggest that the new privacy rule had:

- A negative effect on the quality and the price of ads targeted at iOS users compared to ads targeted at Android users.

✓ The effect seems to intensify:

- With time and adoption of the new OS.
- When targeting audiences or achieve goals that require more data.

✓ Compared to other studies, the effect seems to be low:

- Goldfarb & Tucker (2010) find a reduction in ad effectiveness of 65%:
  - Study the ePrivacy directive in the EU.
  - Effect measured on the stated intension to purchase a good after being exposed to an ad (survey data).

Thank you for your attention!