

Examining the short and long term impact of GDPR on competition in the *AdTech* market

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GDPR consent requirements

- Two purposes of GDPR *a priori* in tension :
 - ▶ Enhancing individuals' control and rights over their personal data
 - ▶ Promoting innovation and economic growth in the digital economy by facilitating the free flow of personal data (within the EU)
- Granting more flexibility in data processing by reducing administrative burdens (remember in France, "Déclaration CNIL") and increasing trust in data handling practices
- A conditional "freedom" : data controllers and processors have to be able to demonstrate they have respected regulation's requirements.

Challenges faced by the *AdTech* market

- From advertisers to publishers, a plethora of intermediaries are involved in the programmatic advertising value chain (the “*AdTech* stack”)
→ a **high level of coordination**, where **cookies** play a crucial role
- These actors **do not necessarily have a direct contact** with users and are **dependent on publishers** to obtain consent for the processing of personal data.

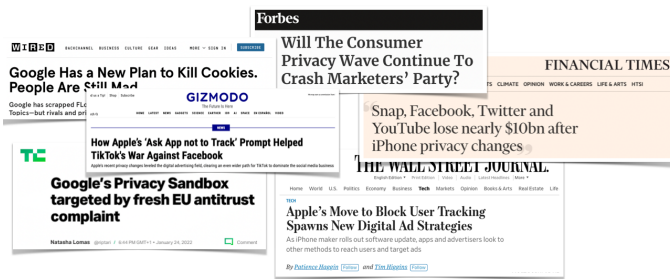
Responses of the *Adtech* market (1/2)

- Advertising industry was involved in the creation of GDPR since 2009
- The *Transparency Consent Framework* (TCF) :
 - ▶ String of characters used to share user consent information across the RTB ecosystem
 - ▶ A standard created by and for the Adtech industry : IAB (Internet Advertising Bureau)
 - ✓ IAB is composed of online advertising industry leaders (Quantcast, Publicis, NBC Universal, Google, Amazon, Microsoft, etc.) and has a central role in the development of technical infrastructure (e.g. OpenRTB)
 - ✓ Closed source, developed, maintained and controlled by IAB
 - ▶ The most successful web Privacy Preference Signal initiatives
 - ✓ 22 % of the 7500 most popular websites implemented TCF
 - ✓ Largely adopted by *AdTech* vendors : 972 vendors in June 2023

Responses of the *Adtech* market (2/2) - Case of *Big Tech* platforms

- TCF is successful, but :
 - ▶ Among the 30 most popular websites, only European sites of Amazon, DrudgeReport and LeMonde.fr use it
 - ▶ Large *Walled Gardens* barely implement it, **while they employ it as an Adtech Vendor** (Google & Youtube, Facebook & Instagram, eBay, Amazon.com & Twitch, AliExpress, Twitter, Yahoo, LinkedIn, Booking.com, Zalando, etc.)
- These platforms use “home-made” consent management tools, with customised translation of GDPR and often an increased use of **logged environment**
- Big Techs' reactions to online privacy demands : Apple's App Tracking Transparency (since April 2021), Google Privacy Sandbox (deprecation of third party cookies in Chrome in the end of 2024)

Concerns about potential harm to competition



- Most proposals come from market players that have a significant presence both in demand (advertisers) and offer (publishers) sides with major Walled Gardens
- Already a highly concentrated market, with a Google-Meta duopoly and a competitive fringe (Perrot, Emmerich, & Jagorel ; 2020)
- Concerns regarding increasing vertical integration, conflicts of interest and a lack of transparency (e.g., Autorité de la concurrence, 2018 ; CMA, 2020 ; OECD, 2020)

GDPR impact on advertising and online advertising

- Lower recorded web traffic and ad revenue (Goldberg, Johnson, & Shriver, 2019; Aridor, Che & Salz, 2020)
- Decline in advertising effectiveness (after EU Privacy Directive) (Goldfarb & Tucker, 2011 ; 2012)
- Increase of data allowance from users, which enabled companies to increase their use of targeted marketing (Godinho de Matos & Adjerid, 2022)
- Increased exit and reduced entry in App market (Janssen, Kesler, Kummer & Wald-fogel 2021)
- **Immediate** reduction in 3rd party cookie use (Libert, Graves & Nielsen 2018; Lefrere, Warberg, Cheyre, Marotta & Acquisti 2020) and increase in Adtech market concentration (Johnson, Shriver, & Goldberg 2022; Peukert, Bechtold, Batikas & Kretschmer 2022)

Research question (1/2)

- How GDPR affected competition in the *AdTech* market ?
- Specifically, we focus on (1) website publishers (data holder) and (2) owners of third party trackers (intermediaries)

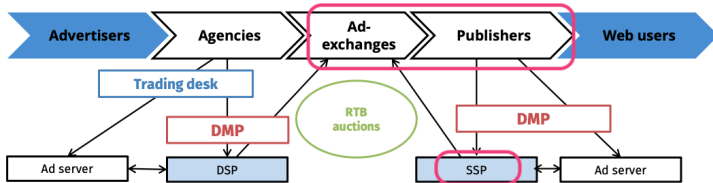


Figure: the *AdTech* stack (source : Megali, 2020)

Research question (2/2)

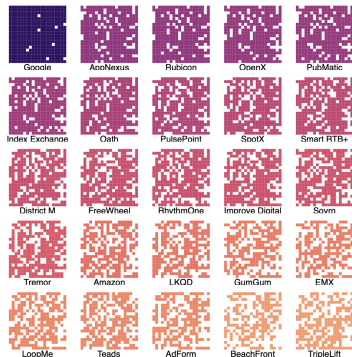
- Impact on publishers' user tracking decisions : have small and big publishers reacted differently ?
 - ▶ User tracking intensity \neq Number of trackers present on a web page
 - ▶ Inequalities of reactions may not appear only before the effective date of GDPR
 - ✓ GDPR became enforceable beginning May 2018 but AdTech industry was involved in shaping the law **since 2009**
 - ✓ GDPR as “the most lobbied pieces of legislation in the history of the European Union” (Hilden 2019 ; Christou & Rashid, 2021)
- Impact on the *AdTech* market structure: are “big” *AdTechs* doing better than others ?

Overview of preliminary results

- GDPR has led to a reduction of the use of trackers, but intensity of visitor tracking may not have been reduced : indeed, **trackers' content length has increased**
- The more a website is **popular**, the more **rapidly and significantly** it reduced tracking.
- The use of major Ad Exchange platforms has increased

Data

- Unbalanced panel on 7146 websites, from May 2017 to May 2023
- Main data set from WhoTracks.Me :
 - ▶ Site-level longitudinal information
 - ▶ Site-Tracker level information were aggregated to site-level
- Webscraping et manual categorization :
 - ▶ TCF adoption, used language
 - ▶ Identification of top AdExchanges and SSPs, most popular trackers



(a) Presence of top Ad Exchange Platforms on the Web (source : LINC CNIL, 2020)

Variables of interest

- Number of third party trackers present on site
- Number of requests made to trackers with tracking (cookie or query string)
- Trackers' content length
- Dummies identifying the use of top Ad Exchange platforms, number of top (Top 5, Top 10) Ad Exchange platforms used by a website

Identification strategy (1/2)

- Difference-in-Difference is not suitable

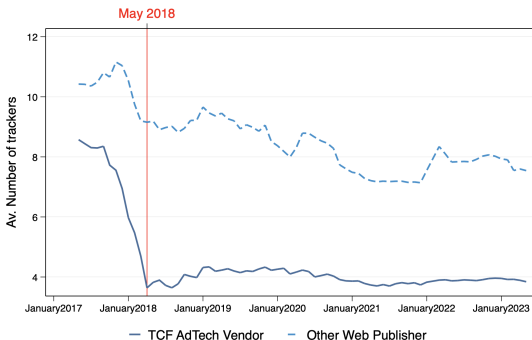


Figure: Evolution of number of trackers used by a website

Identification strategy (2/2)

- Comparison of web tracking practices between different periods
 - ▶ Before May 2018
 - ▶ After May 2018
 - ✓ First 6 months
 - ✓ First 3 years
 - ✓ Whole period after May 2018
- Use of variables characterising websites' inequality of means
 - ▶ Website popularity
 - ▶ Whether it is owned by a TCF Adtech Vendor
- FE estimates or using control variables
 - ▶ Website origin (EU/non EU), Site category, TCF adoption status, country of Top Level Domain, used language, website age, use of https

General evolution of tracking practices

Dependent var. is :	<i>nb_trackers</i>	<i>ln(nb_tracking_requests)</i>	<i>ln(content_length)</i>
<i>first_3y</i> (baseline is before may 2018)	-3.084*** (0.0963)	-1.338*** (0.0315)	0.515*** (0.0306)
<i>after_3y</i> (baseline is before may 2018)	-2.743*** (0.0971)	-1.509*** (0.0317)	0.754*** (0.0309)
<i>ln_site_popularity</i>	0.228*** (0.00651)	0.0436*** (0.00213)	0.0299*** (0.00207)
<i>https_pct</i>	-0.0777** (0.0309)	-0.0420*** (0.0101)	0.00251 (0.00982)
Time FE	✓	✓	✓
Individual FE	✓	✓	✓
Constant	12.18*** (0.0987)	3.277*** (0.0324)	13.35*** (0.0315)
Observations	329,686	326,449	313,082
R-squared	0.121	0.191	0.083
Number of id_site	7,146	7,139	6,877

Note: **FE estimates**. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Comparison of reactions before and after GDPR (1/2) - number of trackers

Dep. var. is <i>nb_trackers</i>	Before GDPR enforcement	First 6m after	First 3y after	whole period after
<i>is_EU</i>	0.828*** (0.114)	-0.0827 (0.0791)	-0.738*** (0.0228)	-1.118*** (0.0169)
<i>ln(site_popularity)</i>	-0.822*** (0.0456)	-0.684*** (0.0364)	-0.0464*** (0.00883)	-0.0142** (0.00653)
<i>TCF_AdTech_vendor</i>	-1.359*** (0.202)	-1.993*** (0.174)	-3.755*** (0.0625)	-3.524*** (0.0472)
<i>use_TCF</i>	4.370*** (0.119)	3.302*** (0.0921)	3.336*** (0.0281)	2.929*** (0.0208)
<i>site_age, site_cat, adexch_tr_exist, gg_adtr_exist, https_pct</i>	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Observations	11,954	14,418	188,286	324,021
R-squared	0.432	0.403	0.331	0.307

Note: OLS Estimates. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Comparison of reactions before and after GDPR (2/2) - trackers' content length

Dep. var. is <i>trackers_content_length</i>	Before GDPR enforcement	First 6m after	First 3y after	whole period after
<i>is_EU</i>	0.0512 (0.0317)	0.119*** (0.0266)	0.0306*** (0.00776)	0.0314*** (0.00578)
<i>ln(site_popularity)</i>	0.131*** (0.0128)	0.113*** (0.0124)	0.107*** (0.00302)	0.111*** (0.00226)
<i>TCF_AdTech_vendor</i>	0.438*** (0.0555)	0.432*** (0.0581)	0.171*** (0.0211)	0.216*** (0.0160)
<i>use_TCF</i>	0.243*** (0.0330)	0.121*** (0.0310)	0.0969*** (0.00953)	0.0719*** (0.00713)
<i>site_age, site_cat, adexch_tr_exist, gg_adtr_exist, https_pct</i>	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Observations	11,274	13,767	178,771	307,778
R-squared	0.221	0.213	0.188	0.184

Evolution of tracking practices in European websites vs. others (1/3)

	<i>nb_trackers</i>	<i>ln(tracking_requests)</i>	<i>ln(content_length)</i>
<i>first3Y</i>	-2.135*** (0.102)	-1.212*** (0.0335)	0.577*** (0.0328)
<i>after3Y</i>	-1.348*** (0.103)	-1.288*** (0.0337)	0.838*** (0.0331)
<i>is_EU · first3Y</i>	-1.090*** (0.0481)	-0.130*** (0.0157)	-0.0724*** (0.0156)
<i>is_EU · after3Y</i>	-2.187*** (0.0488)	-0.364*** (0.0160)	-0.124*** (0.0158)
<i>ln(site_popularity)</i>	0.197*** (0.00648)	0.0380*** (0.00214)	0.0281*** (0.00208)
<i>https_pct</i>	-0.117*** (0.0306)	-0.0507*** (0.0100)	0.00115 (0.00982)
Constant	11.49*** (0.0999)	3.172*** (0.0329)	13.30*** (0.0322)
Individual FE	✓	✓	✓
Time FE	✓	✓	✓
Observations	167,313	165,481	158,910
R-squared	0.326	0.273	0.199

Note: OLS estimates. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Evolution of tracking practices in European websites vs. others (2/3)

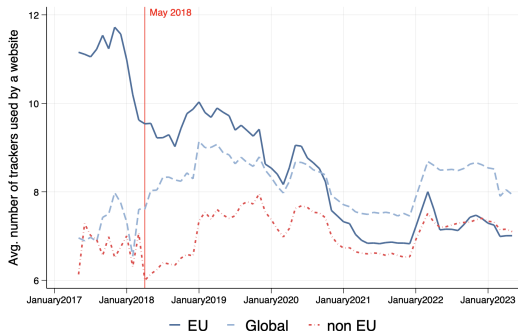


Figure: Evolution of **number of trackers** used by EU vs. non EU websites

Evolution of tracking practices in European websites vs. others (3/3)

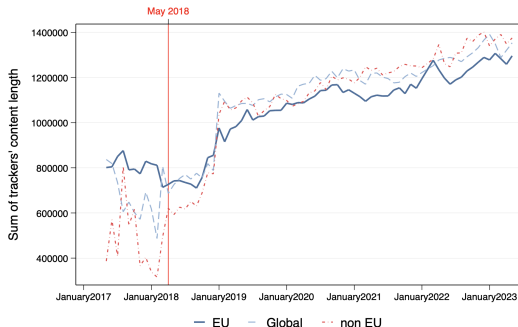


Figure: Evolution of **trackers' content length** used by EU vs. non EU websites

Evolution of the use of RTB

Dep var. is :	Ad Exchange platform is used	
<i>first_3y</i>	-0.0194 (0.0123)	-0.0199 (0.0195)
<i>after_3y</i>	-0.00722 (0.0126)	0.0112 (0.0198)
<i>first_3y · is_EU</i>		0.00805 (0.0251)
<i>after_3y · is_EU</i>		-0.0448* (0.0256)
Individual FE	✓	✓
Observations	99,841	99,841
Number of websites	2,195	2,195

Note: Coefficients are **AME** for Logit FE estimates. **Only websites that have started using at least one Ad Exchange platform during the analyzed period or abandoned using any Ad Exchange platforms** are considered. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Evolution of the use of top Ad Exchange platforms (1/3)

Dep var. is :	Top 10 Ad Exch. is used		Top 5 Ad Exch. is used	
<i>first_3y</i>	-0.00612 (0.0118)	0.0166 (0.0188)	-0.00342 (0.0117)	0.0242 (0.0187)
<i>after_3y</i>	0.00257 (0.0121)	0.0445** (0.0190)	0.00563 (0.0120)	0.0524*** (0.0189)
<i>first_3y · is_EU</i>		-0.0292 (0.0242)		-0.0375 (0.0240)
<i>after_3y · is_EU</i>		-0.0832*** (0.0246)		-0.0908*** (0.0245)
Individual FE	✓	✓	✓	✓
Observations	106,531	106,531	107,023	107,023
Number of websites	2,319	2,319	2,326	2,326

Note: Coefficients are AME for Logit FE estimates. **Only websites that have started using at least one Ad Exchange platform during the analyzed period or abandoned using any Ad Exchange anymore** are considered. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Evolution of the use of top Ad Exchange platforms (2/3)

	All except Adult, Illegal & Public cat.		Content Providers		websites using TCF	
<i>first_3y</i>	0.0575 (0.0429)	0.225*** (0.0504)	0.0220 (0.0490)	0.209*** (0.0505)	0.125** (0.0591)	0.294*** (0.0733)
<i>after_3y</i>	0.0898** (0.0429)	0.252*** (0.0491)	0.0745 (0.0488)	0.250*** (0.0484)	0.253*** (0.0491)	0.414*** (0.0653)
<i>first_3y · is_EU</i>		-0.295*** (0.0766)		-0.379*** (0.0841)		-0.259*** (0.100)
<i>after_3y · is_EU</i>		-0.292*** (0.0787)		-0.373*** (0.0863)		-0.263** (0.106)
Individual FE	✓	✓	✓	✓	✓	✓
Observations	88,849	88,849	51,834	51,834	11,683	11,683
Number of websites	1,895	1,895	1,090	1,090	229	229

Note: Dependent variable is a dummy which identifies whether a **website uses one of the top 5 Ad Exchange platforms**. Coefficients are AME for Logit FE estimates. Only **websites using at least one Ad Exchange platform during the whole period** are included. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Evolution of the use of top Ad Exchange platforms (3/3)

	All except Adult, Illegal & Public cat.		Content Providers		websites using TCF	
<i>first_3y</i>	0.587*** (0.0160)	0.390*** (0.0326)	0.711*** (0.0188)	0.487*** (0.0407)	1.158*** (0.0272)	0.911*** (0.0630)
<i>after_3y</i>	0.896*** (0.0162)	0.732*** (0.0328)	1.074*** (0.0191)	0.888*** (0.0409)	1.558*** (0.0276)	1.293*** (0.0635)
<i>first_3y · is_EU</i>		0.270*** (0.0375)		0.296*** (0.0460)		0.300*** (0.0698)
<i>after_3y · is_EU</i>		0.196*** (0.0378)		0.216*** (0.0464)		0.328*** (0.0706)
Individual FE	✓	✓	✓	✓	✓	✓
Constant	1.985*** (0.0156)	2.058*** (0.0192)	2.097*** (0.0183)	2.177*** (0.0229)	2.477*** (0.0262)	2.529*** (0.0286)
Observations	209,361	209,361	162,112	162,112	74,811	74,811
Number of websites	4,318	4,318	3,306	3,306	1,460	1,460

Note: Dependent variable is Number of Top5 Ad Exchange platforms (used by a website). FE estimates. Only **websites using at least one Ad Exchange platform** are included. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Main results

- GDPR has led to a **reduction of the use of trackers**, but intensity of visitor tracking may not have been reduced (though it is less the case for European websites)
- This is especially the case for **popular websites and websites owned by publishers who are vertically integrated within the Adtech market**
- **Major Ad Exchange vendors** are not necessarily favoured to the detriment of small vendors. It is rather that GDPR has led to an increase of the average number of Ad Exchange platforms used by a website

