

Who benefits from Google's SERP?

The impact of the DMA on the Air Travel Market

**PRELIMINARY AND INCOMPLETE
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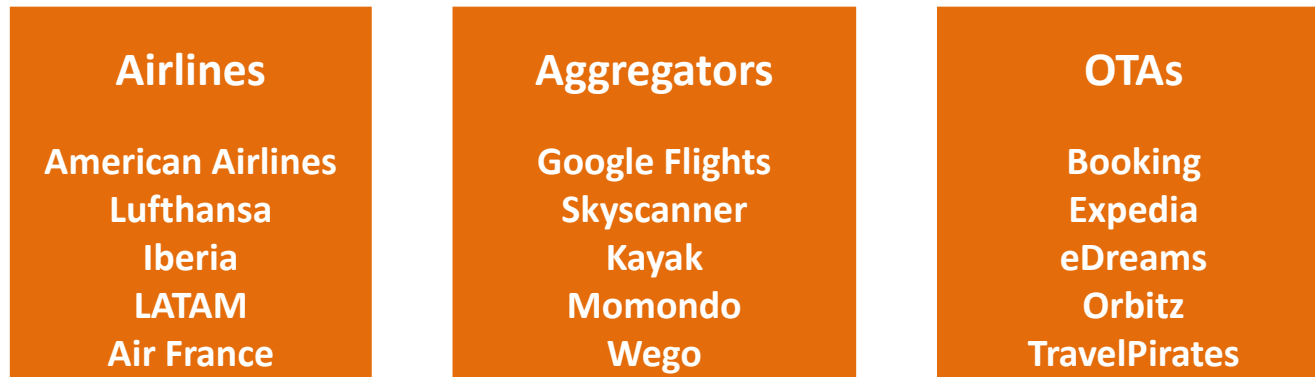
Workshop on the Economics of the Digital Markets Act (DMA)
Brussels, September 22-23, 2025

Digital Markets Act (DMA)

- EU regulation to keep digital markets fair and contestable
 - Approved EU: Sep 2022
 - Start Applying: May 2023
 - Enforced: **March 7, 2024**
- Targets large digital platforms (gatekeepers) with strong economic position, significant user base in the EU, and durable market power: Amazon, Apple, Booking, Facebook, Google or Microsoft
- Imposes obligations: no self-preferencing, allow interoperability, data portability, no unfair lock-in
- We focus on **Art. 6(5)**, which bans self-preferencing in ranking, indexing, and results display. This directly affects Google: Google Shopping; Google Hotels; Google Maps; **Google Flights**
- **Response:** Google changed its **SERP** in March 6, 2024

What do we do?

- Analyze effects of Google SERP's redesign in the EU air travel market
- Three players compete for search traffic



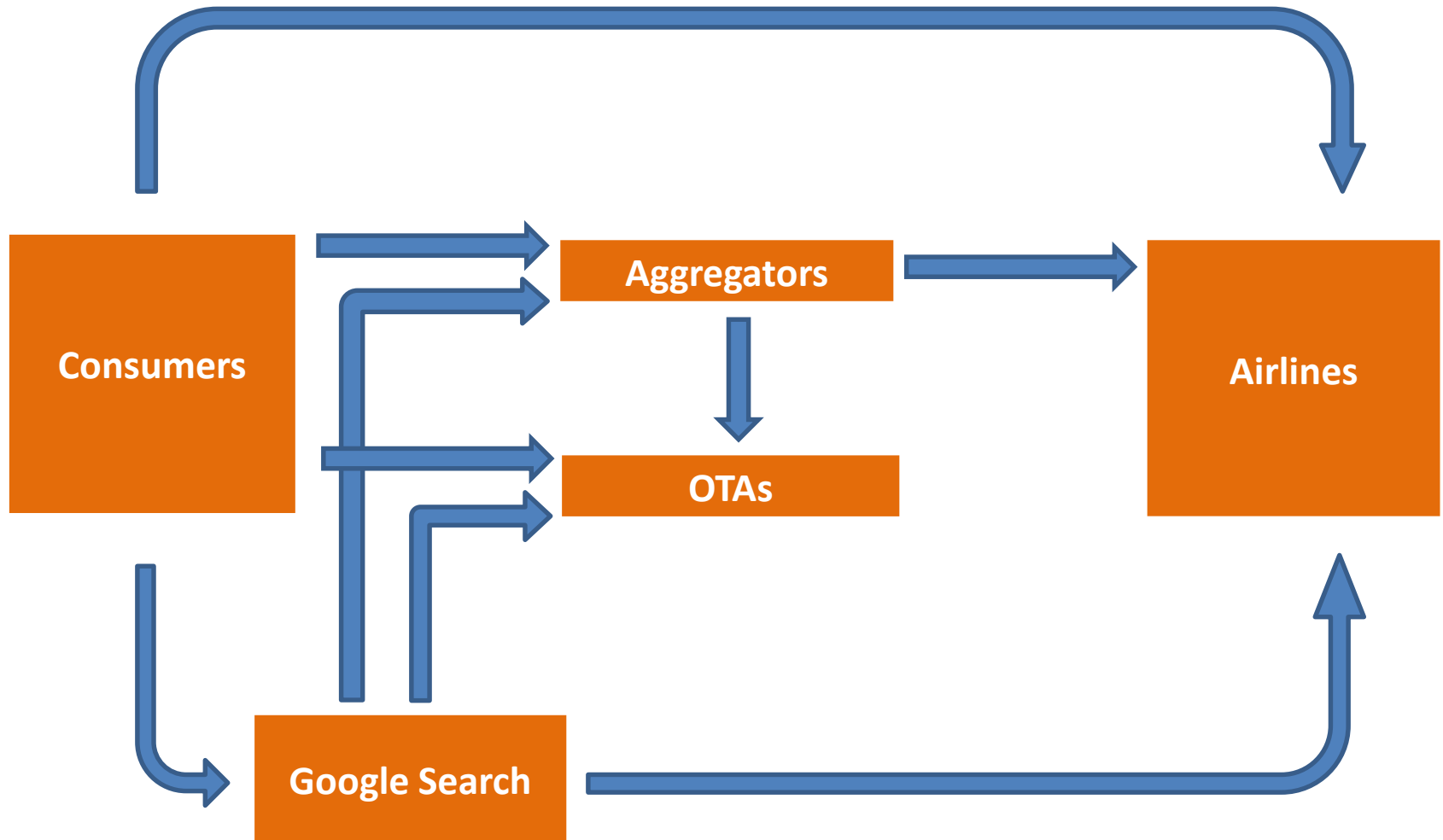
- **What do we do?** DiD model comparing organic search traffic in the EU (France, Germany, Italy and Spain) and in UK/US, before and after the redesign of Google's SERP in March 6th 2024.
- **What do we find?** Small low cost airlines and Aggregators/OTAs sites receive more organic search traffic. No effect on large Agrregatos/OTAs.

Literature Review

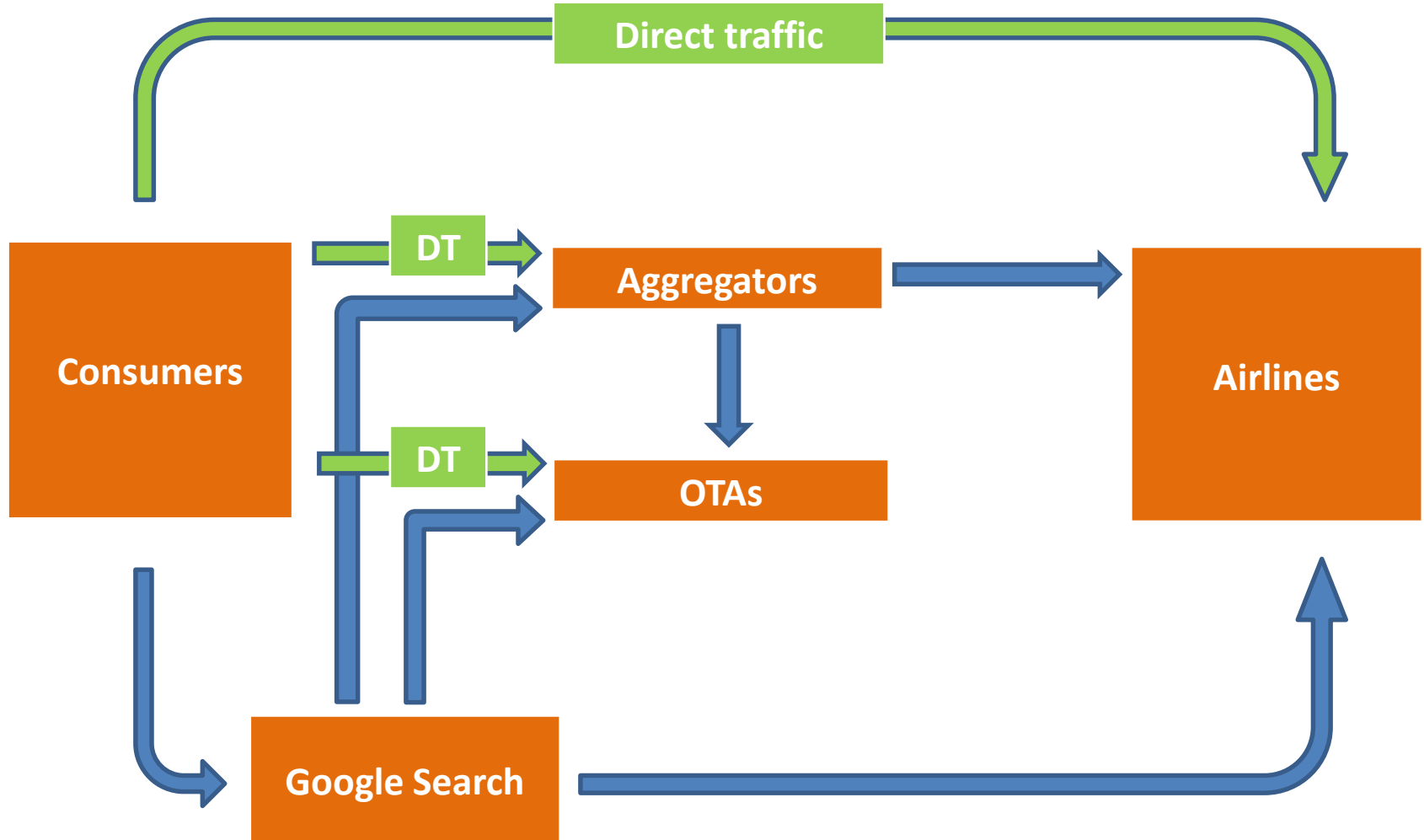
- **SERP Redesign & DMA Compliance:** Pape & Rossi (2025); Püplichhuisen & Sirries (2025): **we contribute to this research line.**
- **Algorithmic Bias & Self-preferencing:** Chiou (2017); Farronato et al. (2023); Hunold et al. (2022); Waldfogel (2024)
- **Search Rankings & Traffic Allocation:** Baye et al. (2016); Ursu (2018); Calzada et al. (2023)
- **Default Effects & Platform Dominance:** Allcott et al. (2025); Decarolis et al. (2024)
- **Air Travel & Online Distribution:** Ater & Orlov (2015); Bilotkach et al. (2024)

- **Aggregators:** compares flight prices and availability from multiple sources (airlines and OTAs). Don't sell tickets directly, but redirects users to airlines or OTAs
 - CPC (Cost per Click): earns money for every redirected user
 - CPA (Cost per Acquisition); commission if the booking is completed
 - Advertising: airlines/OTAs pay to appear at the top
 - Affiliate commissions for hotels, cars, insurance
 - Examples: Skyscanner, Kayak, Momondo, Cheapflights
 - We include Flight Deal Sites in this group: TravelPirates, HolidayPirates.
- **Online Travel Agencies (OTAs):** users search, book, and pay for flights. Agreements with airlines and access to GDS: can issue tickets and provide after-sales services
 - Commission margins on tickets
 - Service fees (changes, cancellations, support)
 - Cross-selling (hotels, cars, insurance)
 - Examples: Booking, Expedia, Expedia, eDreams, eSky

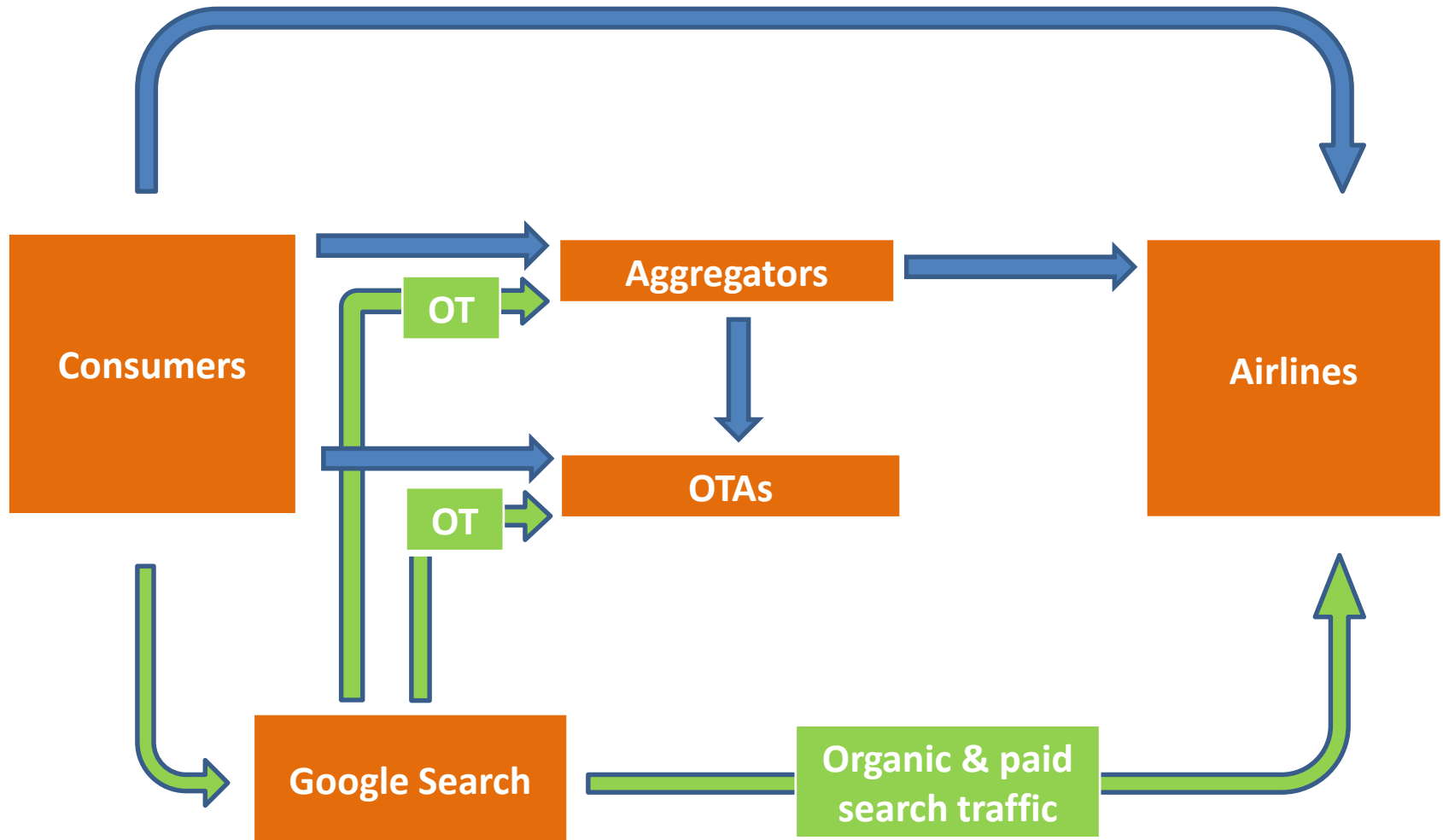
Visits to Airlines Websites



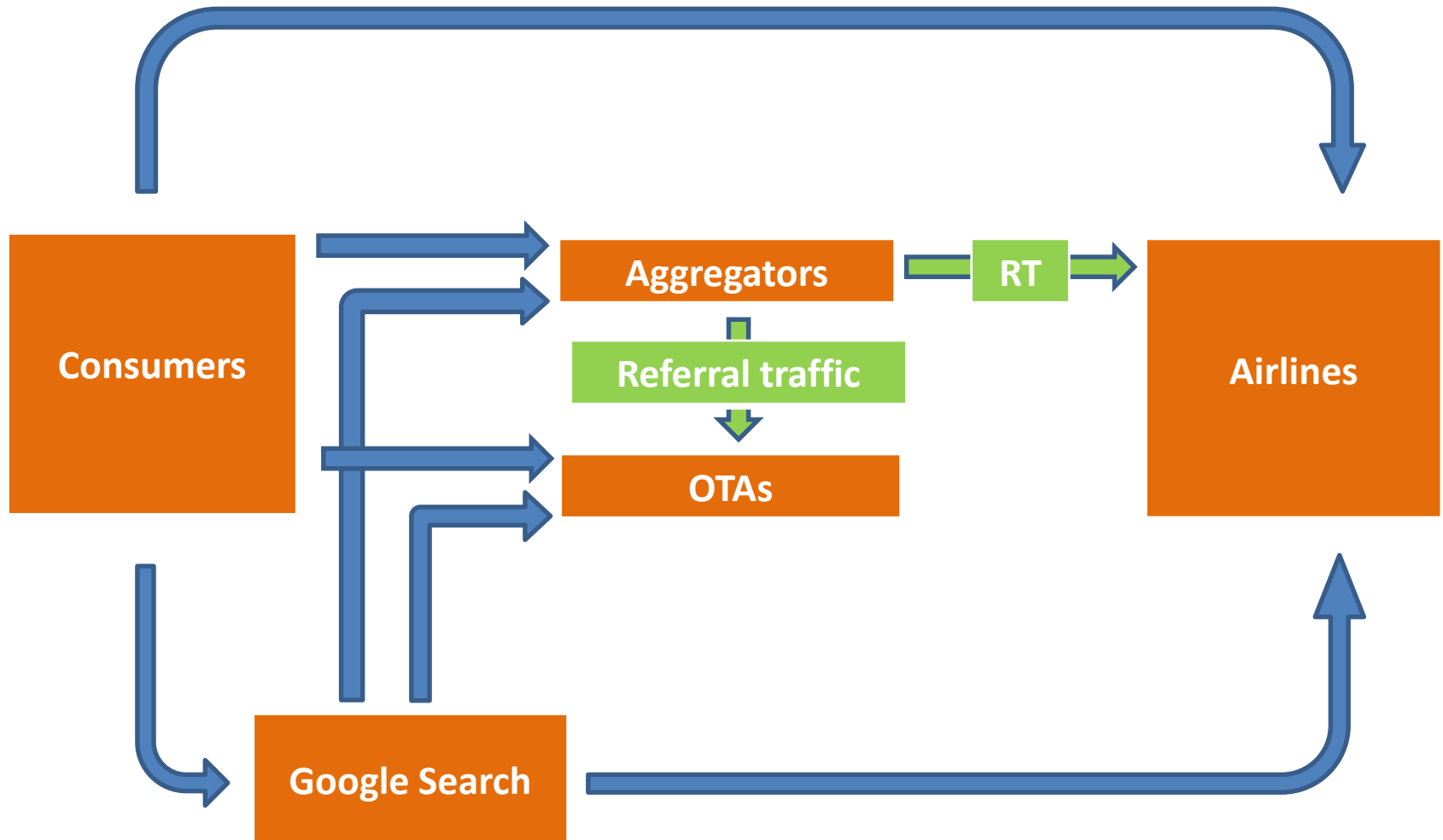
Visits to Airlines Websites



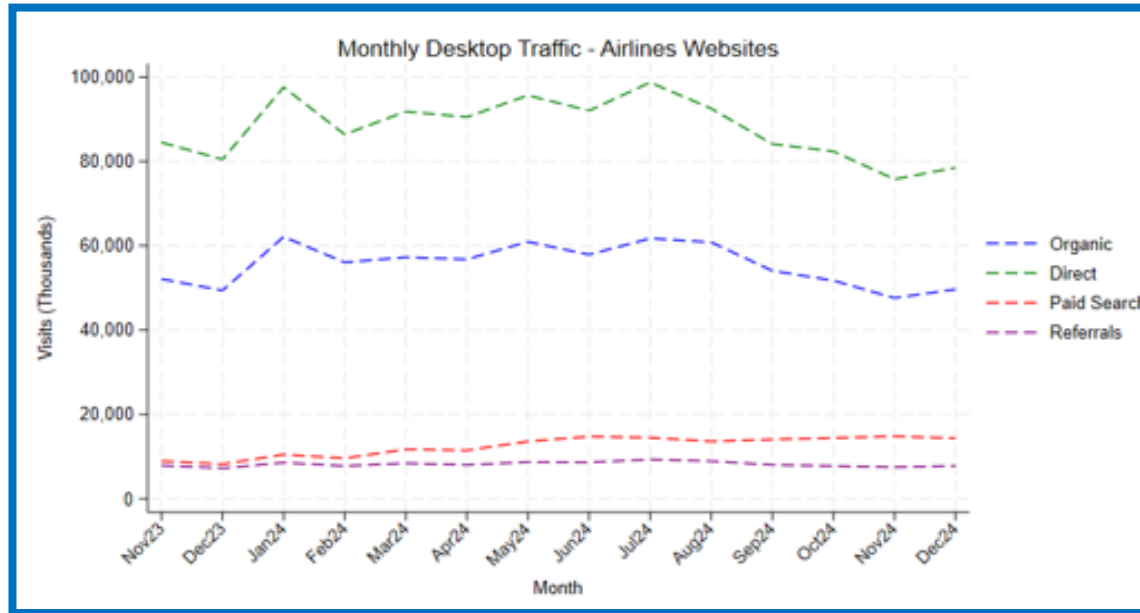
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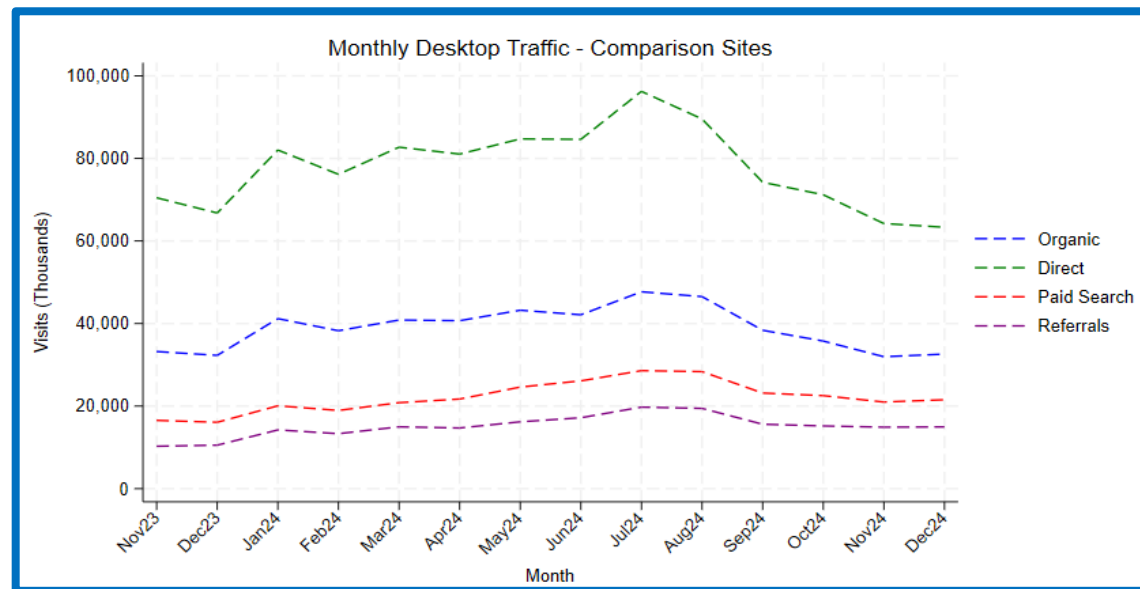
Visits to Airlines Websites



Desktop Traffic to Airline and Comparison Sites



**1/3 is organic
search traffic**



**1/4 is organic
search traffic**

Google's SERP Before March 7th, 2024

(still in use in the UK and US)

Flight London - Barcelona

All

Flights

News

Images

Videos

Short videos

Shopping

More +

Flights to Barcelona

Flights

Flight status

Airports

Find flights on

Skyscanner

Kayak

London (all airports)

Barcelona, Spain (BCN)

Sat 12 Jul

< >

Mon 14 Jul

< >

✓ Economy

✓ Round trip

Nonstop

Less emissions

Jul

<

30

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Multiple airlines

2h 10m

Nonstop

from £69

Ryanair

2h 10m

Nonstop

from £79

Vueling

2h 10m

Nonstop

from £88

easyJet

2h 10m

Nonstop

from £115

Save £19 – Non-stop flights from £50 if you fly to [GRO](#)

Flights to Barcelona

Flights

Flight status

Airports

Find flights on

[Skyscanner](#) [Kayak](#)

London (all airports)

Barcelona, Spain (BCN)

Sat 12 Jul

Mon 14 Jul

✓ Economy

✓ Round trip

Nonstop

Less emissions



Multiple airlines	2h 10m	Nonstop	from £69
Ryanair	2h 10m	Nonstop	from £79
Vueling	2h 10m	Nonstop	from £88
easyJet	2h 10m	Nonstop	from £115

Save £19 – Non-stop flights from £50 if you fly to [GRO](#)[Show flights](#)

Skyscanner

<https://www.skyscanner.net> • United Kingdom • London

Cheap Flights from London (LOND) to Barcelona (BCN)

The cheapest time to fly from London to Barcelona is typically in January. This period is usually best for the cheapest fares.

Starting from £28.00

People also ask

How long is the flight from the UK to Barcelona?

Which UK airports fly directly to Barcelona?

Is it cheaper to fly or train from London to Barcelona?

How long is the flight from Gatwick to Barcelona?

[Feedback](#)

Google

<https://www.google.com> • Flights • From London

Find cheap flights from London to Barcelona

Popular airlines from London to Barcelona - Vueling, Non-stop, from £67. Typical price: £45–165 - British Airways, Non-stop, from £161. Typical price: £110–255. Starting from £67.00



Flight status

Sat 31 May Sun 1 Jun Mon 2 Jun Tue 3 Jun

18:20	to Barcelona BCN	
VY 7825	ARRIVED	
19:20	to Barcelona BCN	
BA 482	ARRIVED	

[Show all flight updates](#)

EasyJet

<https://www.easyjet.com> • cheap-flights • barcelona

Cheap flights from London Gatwick to Barcelona ...

Check out our low fare finder to book cheap flights from London Gatwick to Barcelona. Tickets start at £35.99! Compare daily airline departures, our best value ...



Google's SERP After March 7th, 2024

Flight London - Barcelona

All **Airline options** Flight sites News Images Videos Short videos More +

Round trip Dates ▾ Tracker Today Airports Flight Status Price Ryanair

Flights to Barcelona :

Airline options

Round trip prices from London - 12-14 Jul

Ryanair	Nonstop	from €94 >
Vueling	Nonstop	from €104 >
easyJet	Nonstop	from €137 >

[More airline options >](#)

Flight sites

Round trip prices from London - 12-14 Jul

Cheap Flights from London (LOND) to Barcelona...	Find Cheap Flights from London to Barcelona...	Cheap Flights from London to Barcelona (LON-BCN) -...	Book cheap flights from London to Barcelona...
Skyscanner From €77	Google From €82	Kayak From €75	Booking.com From €104

Flight London - Barcelona




All Airline options Flight sites News Images Videos Short videos More

Round trip Dates Tracker Today Airports Flight Status Price Ryanair

Flights to Barcelona

Airline options





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More airline options >

Flight sites

Round-trip prices from London - 12-14 Jul

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More flight sites >

Flight Status

Sat, 31 May Sun, 1 Jun Mon, 2 Jun Tue, 3 Jun

16:55 VY 6026	to Barcelona BCN ARRIVED LATE	>
17:20 BA 2339	to Barcelona BCN ARRIVED	>

Show all flight updates >

 Skyscanner
<https://www.skyscanner.net> - United Kingdom - London

Cheap Flights from London (LOND) to Barcelona (BCN)

The cheapest time to fly from London to Barcelona is typically in January. This period is usually best for the cheapest fares.

12-14 Jul
London to Barcelona - Non-stop - Round trip
from €77 >

People also ask

- How long is the flight from London to Barcelona today? >
- Is it cheaper to fly or train from London to Barcelona? >
- How far is Barcelona from London by flight? >
- How far is Barcelona to London by plane? >

Feedback

 Google
<https://www.google.com> - Flights - From London

Find Cheap Flights from London to Barcelona (LON - BCN)

Use Google Flights to find cheap flights from London to Barcelona starting at €84, and book tickets for your next trip.

12-14 Jul
London to Barcelona - Non-stop - Round trip
from €82 >

Data

- Traffic source: Similarweb
- Devices: Desktop (weekly data) and Mobile (monthly data)
- Channels: direct; **organic search**, paid search and referrals
- Period: November 2023 – Dec 2024
- **Treated sites:** 4 EU countries (France, Germany, Italy and Spain)
- **Control sites:** United Kingdom and the United States
- **Classification for Airlines:**
 - Pricing Strategy: Low Cost Carriers (LCC) & Network Carriers (NC)
 - Market Share: Top 5 National Airlines (TNA) & Bottom National Airlines (BNA)
 - Visibility: Top Ranking Airlines (TRA) and Bottom Ranking Airlines (BRA)
- **Classification for Comparison Sites:**
 - Top 3, Top 5, and Non-Top
 - Aggregators & OTAs
- Domains with at least daily market share of 0.5% in air travel category of Similarweb in at least one country. Airlines with at least 0.5% of annual seat capacity in national market (RDC aviation, Apex schedules)

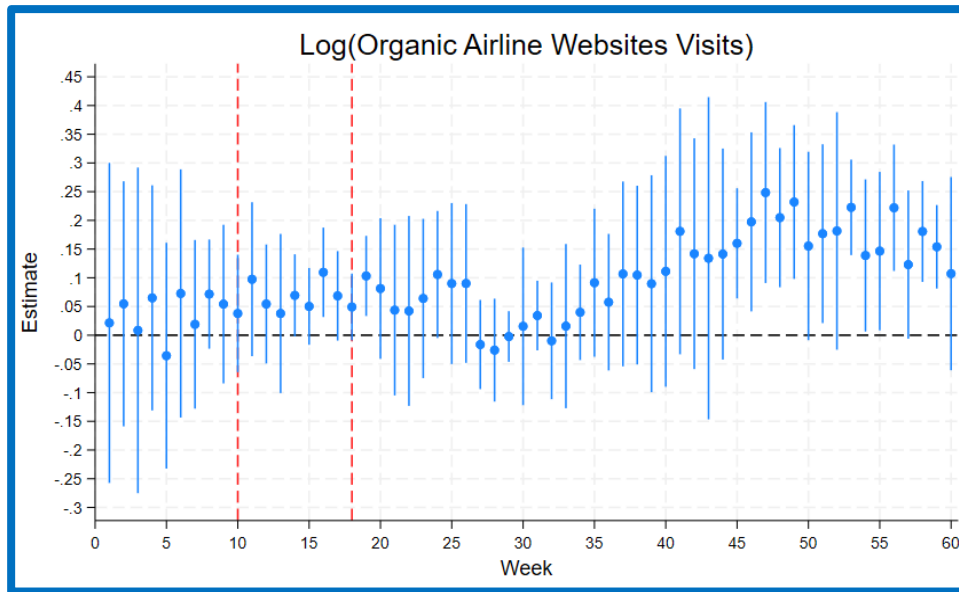
Empirical strategy

Difference-in-Differences (DiD) at the domain-week level

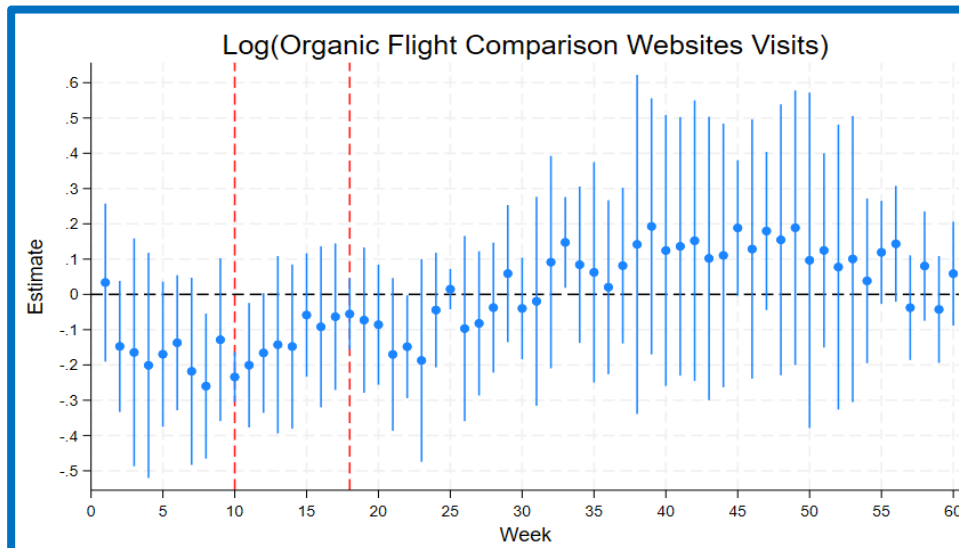
$$\ln(Y_{dct}) = \beta EU_{dc} \times Post_t^{DMA} + \alpha_c + \delta_d + \theta_{dc} + \gamma_t + \varepsilon_{dct} \quad (1)$$

- Y_{dct} is the number of visits -including total, **organic search**, direct, paid search and referral visits - received by the **desktop and mobile websites** of domain d in country c during week t .
- We include fixed effects per country (α_c), domain (δ_d), domain (θ_{dc}) and week (γ_t).
- Treated group: EU countries (France, Germany, Italy and Spain)
- Control group: United Kingdom and United States
- DMA: March 7, 2024

Pre-Treatment Trends for Desktop Organic Traffic



Parallel pre-trends



Parallel pre-trends

Main Results: desktop

	Airlines Websites					Flight Comparison Websites				
	Total	Organic	Direct	Paid Search	Referrals	Total	Organic	Direct	Paid Search	Referrals
EU x PostDMA	0,0046 (0,0190)	0.0625** (0,0207)	0,0112 (0,0337)	-0.0714 (0,0436)	0,0379 (0,1146)	0.1380** (0,0353)	0.1863** (0,0509)	0.1083** (0,0376)	0,1067 (0,0843)	0.2385*** (0,0081)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country-Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Week FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R2 Adjust	0,9680	0,9534	0,9660	0,8669	0,9121	0,9634	0,9431	0,9580	0,9072	0,9395
N	20.252	20.252	20.252	17.859	20.100	9.393	9.393	9.393	6.888	9.198

Heterogenous effects: airlines, desktop & organic

	Low Cost Carriers					Network Carriers				
	Total	TNA	BNA	TRA	BRA	Total	TNA	BNA	TRA	BRA
EU x PostDMA	0.1325** (0,0411)	0,0741 (0,1042)	0.1490** (0,0564)	0,0667 (0,0659)	0.2444* (0,1284)	0.0393* (0,0155)	0,0551 (0,0602)	0.0345** (0,0164)	0.0641** (0,0236)	0,0004 (0,0277)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country-Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Week FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R2 Adjust	0,9623	0,9778	0,9329	0,9807	0,8597	0,9473	0,9932	0,9265	0,9700	0,7879
N	6.344	1.159	5.185	3.294	3.050	13.908	671	13.237	6.893	7.015

- Pricing Strategy: Low Cost Carriers (LCC) and Network Carriers (NC)
- Market Share: Top National Airlines (TNA): 5 domains, 60-85% seats in the country; Bottom National Airlines (BNA)
- Visibility: Top Ranking Airlines (TRA): domains above the median of visits

Heterogenous effects: airlines, desktop & organic

	Low Cost Carriers					Network Carriers				
	Total	TNA	BNA	TRA	BRA	Total	TNA	BNA	TRA	BRA
EU x PostDMA	0.1325** (0,0411)	0,0741 (0,1042)	0.1490** (0,0564)	0,0667 (0,0659)	0.2444* (0,1284)	0.0393* (0,0155)	0,0551 (0,0602)	0.0345** (0,0164)	0.0641** (0,0236)	0,0004 (0,0277)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country-Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Week FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R2 Adjust	0,9623	0,9778	0,9329	0,9807	0,8597	0,9473	0,9932	0,9265	0,9700	0,7879
N	6.344	1.159	5.185	3.294	3.050	13.908	671	13.237	6.893	7.015

Heterogenous effects: comp. sites, desktop & organic

	General	Top 3	Top 5	Non-Top
EU x PostDMA	0.1863** (0,0509)	0,0217 (0,0346)	0,0967 (0,1101)	0.2026*** (0,0450)
Country FE	✓	✓	✓	✓
Domain FE	✓	✓	✓	✓
Country-Domain FE	✓	✓	✓	✓
Week FE	✓	✓	✓	✓
R2 Adjust	0,9431	0,9872	0,9820	0,8679
N	9.393	1.037	1.464	7.929

Heterogenous effects: comp. sites, desktop & organic

	General	OTA	Agregator
EU x PostDMA	0.1863** (0,0509)	0,1335 (0,0797)	0.2479*** (0,0522)
Country FE	✓	✓	✓
Domain FE	✓	✓	✓
Country-Domain FE	✓	✓	✓
Week FE	✓	✓	✓
R2 Adjust	0,9431	0,9387	0,9482
N	9.393	5.062	4.331

Main Results: Mobile

	Airlines Websites					Flight Comparison Websites				
	Total	Organic	Direct	Paid Search	Referrals	Total	Organic	Direct	Paid Search	Referrals
EU x PostDMA	-0,0007 (0,0288)	0,0390 (0,0375)	-0,0173 (0,0336)	-0.0770* (0,0411)	0,0153 (0,0611)	0.1915*** (0,0365)	0.1798** (0,0600)	0.1954*** (0,0360)	0.1113* (0,0449)	0.2793** (0,0898)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country-Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Month FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R2 Adjust	0,9648	0,9557	0,9577	0,9869	0,9367	0,9486	0,9224	0,9399	0,9763	0,9415
N	6.426	6.419	6.426	5.424	6.426	3.948	3.925	3.948	2.989	3.948

Heterogenous effects: airlines, mobile & organic

	Low Cost Carriers					Network Carriers				
	Total	TNA	BNA	TRA	BRA	Total	TNA	BNA	TRA	BRA
EU x PostDMA	0,0768 (0,0541)	0,1063 (0,1370)	0,0792 (0,0660)	-0,0866 (0,1117)	0.2033** (0,0522)	0.0196 (0,0402)	0.1338* (0,0544)	0,0155 (0,0429)	-0.0650** (0,0168)	0,1159 (0,0728)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country-Domain FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Week FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
R2 Adjust	0,9612	0,9799	0,9376	0,9834	0,7902	0,9508	0,9921	0,9383	0,9641	0,8523
N	2.337	280	2.057	994	1.343	4.082	140	3.942	2.250	1.832

- Pricing Strategy: Low Cost Carriers (LCC) and Network Carriers (NC)
- Market Share: Top National Airlines (TNA): 5 domains, 60-85% seats in the country; Bottom National Airlines (BNA)
- Visibility: Top Ranking Airlines (TRA): domains above the median of visits

Heterogenous effects: comp. sites, mobile & organic

	General	Top 3	Top 5	Non-Top
EU x PostDMA	0.1798** (0,0600)	0,0402 (0,0632)	0,0551 (0,0407)	0.1921** (0,0649)
Country FE	✓	✓	✓	✓
Domain FE	✓	✓	✓	✓
Country-Domain FE	✓	✓	✓	✓
Week FE	✓	✓	✓	✓
R2 Adjust	0,9224	0,9779	0,9837	0,8565
N	3.925	238	350	3.575

Heterogenous effects: comp. sites, mobile & organic

	General	OTA	Agregator
EU x PostDMA	0.1798** (0,0600)	0.1864* (0,0840)	0.1686** (0,0598)
Country FE	✓	✓	✓
Domain FE	✓	✓	✓
Country-Domain FE	✓	✓	✓
Week FE	✓	✓	✓
R2 Adjust	0,9224	0,9140	0,9346
N	3.925	2.161	1.764

Summary of results

- **Airlines: Redistribution towards LLCs and low visible players**
 - **LCCs:** +13% desktop, +8% mobile (significant for less visible carriers)
 - **NCs:** +4% desktop, +2% mobile (significant for larger carriers)
 - Small national airlines (BNA, BRA): significant increases
- **Comparison sites: Promotion smaller platforms via visibility boost**
 - Non-Top platforms: +18-20% (more clear effects for aggregators)
 - Top 3 & Top 5: no significant effect
 - Important increase in referral traffic
- **Country Heterogeneity:** main results consistent across countries

Which are the results for prices?

- Data on fares and supply from RDC Aviation
- Data at the **route-airline level**
- Routes that link **airports in the UK with the EU countries**
- **Monthly** data: March 2023 – March 2025
- Posted prices:
 - bookings one month and one week before the flight departure
 - also weighted fares, considering number of bookings in different periods
 - focus on one-way flights
 - focus on routes with $HHI < 1$
 - include all government and airport taxes
- Controls at route level: flight frequency; flights in origin and destination airports; flights operate by the airline in the route, HHI index
- Airlines characteristics: LLC (according to the ICAO); participation in global alliances (oneworld, Star Alliance, SkyTeam), top or bottom national airlines.
 - 94% of observations refer to **low-cost airlines**
 - 78% of observations involve **top national airlines**
 - **86% of observations for Spain, 11% for Italy**, and 4% for France and Germany.

Empirical strategy

We estimate the following model at the route-airline level i month m and in year t :

$$\ln(fares_{imt}) = \alpha + \beta DMA_{imt} + \lambda X_{imt} + \gamma_i + \eta_m + v_t + \varepsilon_{imt} \quad (2)$$

- $fares_{imt}$ is the mean posted fares (one month, one week, weighted fares)
- Treated route-airline pairs: origin airport in the UE and destination in the UK.
- Control route-airline pairs: origin airport in the UK and destination in the EU.
- $DMA=1$ when origin airport in the EU and time after March 2024
- Treated group: EU countries (France, Germany, Italy and Spain)
- X_{imt} : control variables at the route level

Effects on fares

VARIABLES	(1) lweightedaverage	(2) lonemonthfare	(3) loneweekfare
DMA	0.0161 (0.0138)	0.0153 (0.0162)	-0.0375** (0.0195)
ln(flights_origin_airport)	0.206*** (0.0551)	0.110** (0.0519)	-0.00864 (0.0533)
ln(flights_destination_airport)	0.0821* (0.0442)	0.0629 (0.0443)	-0.0810* (0.0472)
ln(flights_airline)	-0.243*** (0.0393)	-0.248*** (0.0422)	-0.268*** (0.0464)
Constant	4.234*** (0.784)	5.246*** (0.789)	7.508*** (0.841)
Observations	10,134	10,134	10,134
R-squared	0.477	0.424	0.370
Number of routeairline	692	692	692
Year FE	YES	YES	YES
Route-airline FE	YES	YES	YES
Month FE	YES	YES	YES
Unit	Route-airline	Route-airline	Route-airline
Sample	UK-big EU	UK-big EU	UK-big EU
Airline	All	All	All
HHI	<0.5	<0.5	<0.5
Period	20233 to 20253	20233 to 20253	20233 to 20253
Clusters	Route	Route	Route

Effects on fares

VARIABLES	(1) loneweekfare	(2) loneweekfare	(3) loneweekfare	(4) loneweekfare	(5) loneweekfare	(6) loneweekfare	(7) loneweekfare
DMA	-0.0233** (0.0112)	-0.0336** (0.0145)	-0.0460** (0.0196)	0.0604 (0.0680)	-0.0434** (0.0187)	-0.0591** (0.0236)	-0.0497 (0.0432)
Observations	32,953	18,337	10,134	627	9,507	7,906	2,228
R-squared	0.276	0.295	0.526	0.346	0.389	0.389	0.366
Number of routeairline	1,902	1,388		57	635	527	165
Year FE	YES	YES	YES	YES	YES	YES	YES
Route-airline FE	YES	YES	NO	YES	YES	YES	YES
Month FE	YES	YES	YES	YES	YES	YES	YES
Origin FE	NO	NO	YES	NO	NO	NO	NO
Destination FE	NO	NO	YES	NO	NO	NO	NO
Airline FE	NO	NO	YES	NO	NO	NO	NO
Unit	Route-airline	Route-airline	Route-airline	Route-airline	Route-airline	Route-airline	Route-airline
Sample	UK-big EU	UK-all EU	UK-big EU	UK-big EU	UK-big EU	UK-big EU	UK-big EU
Airline	All	All	All	Network	LCC	Top national	Bot national
HHI	All	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Clusters	Route	Route	Route	Route	Route	Route	Route

Conclusions

Google Flights was not neutral for the market

SERP design matters and can affect competition

Thanks!