Spoiler alert: yes!

Are some prices more equal than others?

Evaluating store-based price differentiation

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TEST
Flugbuchung per Smartphone
Achtung! **Neue Abzocke!**

Fotos: Depositphotos, Oman Air, 123rf/rawpixel, pixabay

Flugtickets mit dem Smartphone zu buchen, kann richtig teuer werden. Clever reisen! fand Preisunterschiede von bis zu 160 Euro gegenüber Buchungen mit dem PC.

Große Preisunterschiede bei Ticketpreisen

Für unseren Stichproben haben wir online die Ticketpreise von Airlines, Reise-, sowie von Flugportalen abgefragt. Für jede Abfrage

Auch die Smartphone-Abfragen für Economy-Tickets förderten deutliche Unterschiede zutage. Sie waren bei Bravofly bis zu 19,50 Euro teurer, als die mit dem heimischen PC ermittelten.

Daneben gab auch die Preisabfrage beim Reiseportal Ebookers zu denken. Hier war

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Price Discrimination vs. Differentiation

Price differentiation

Price discrimination

Price Discrimination vs. Differentiation

BigMac Index

Price differentiation

Price discrimination

Price Discrimination vs. Differentiation

BigMac Index

Price differentiation

Price discrimination

Serving lower prices to iPhone users

vs
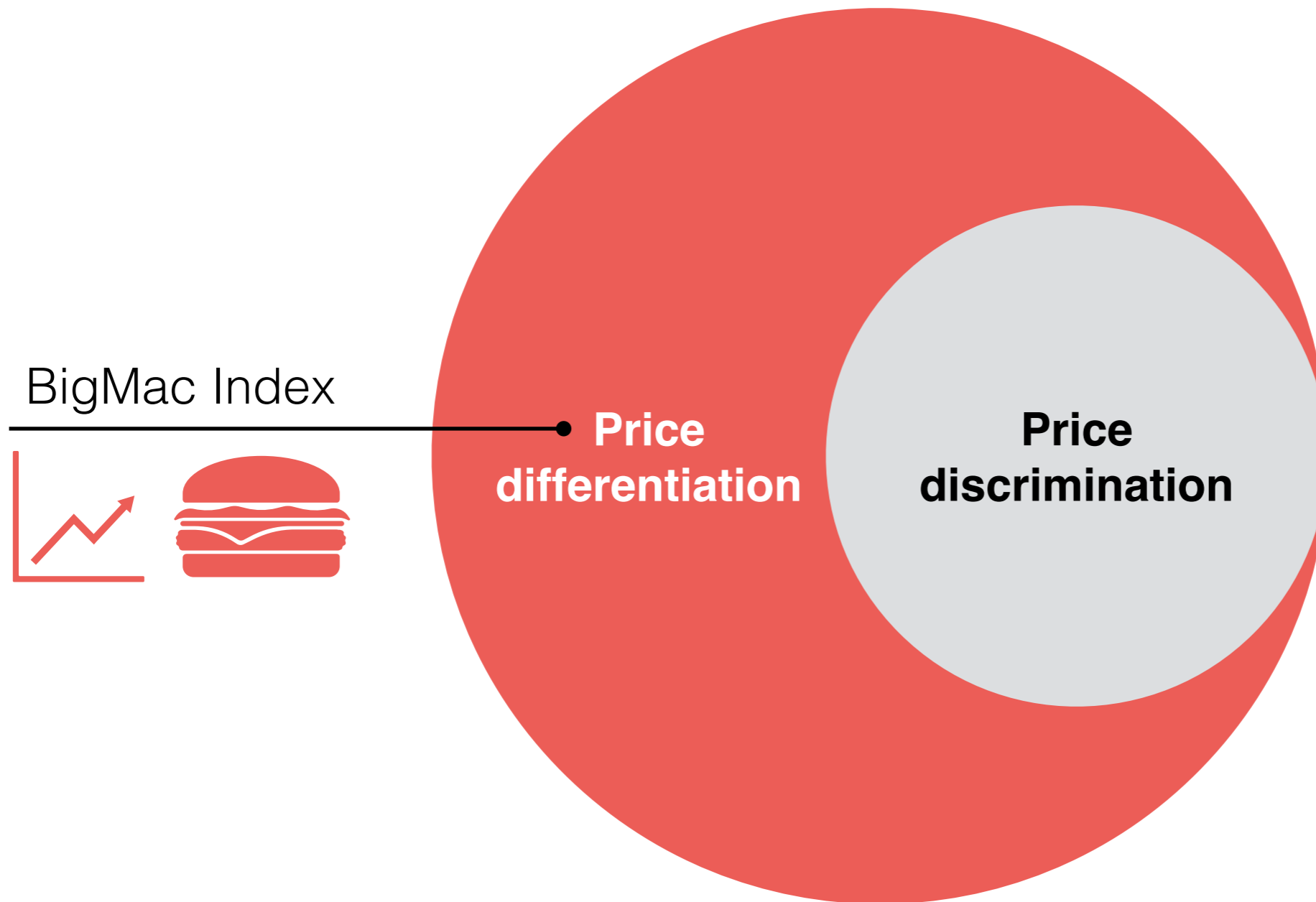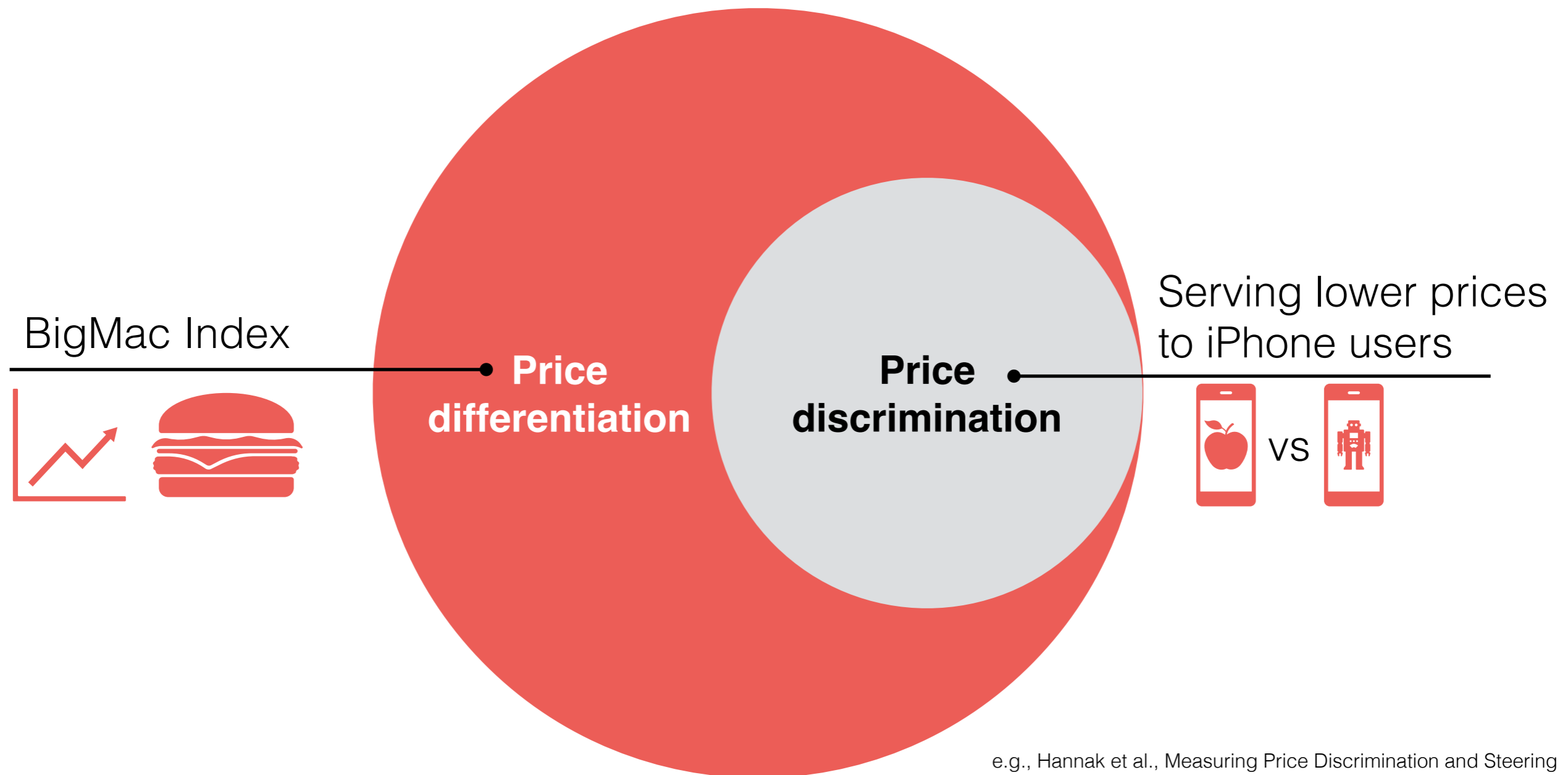
e.g., Hannak et al., Measuring Price Discrimination and Steering on E-commerce Web Sites, 2014

A simple E-Commerce Model
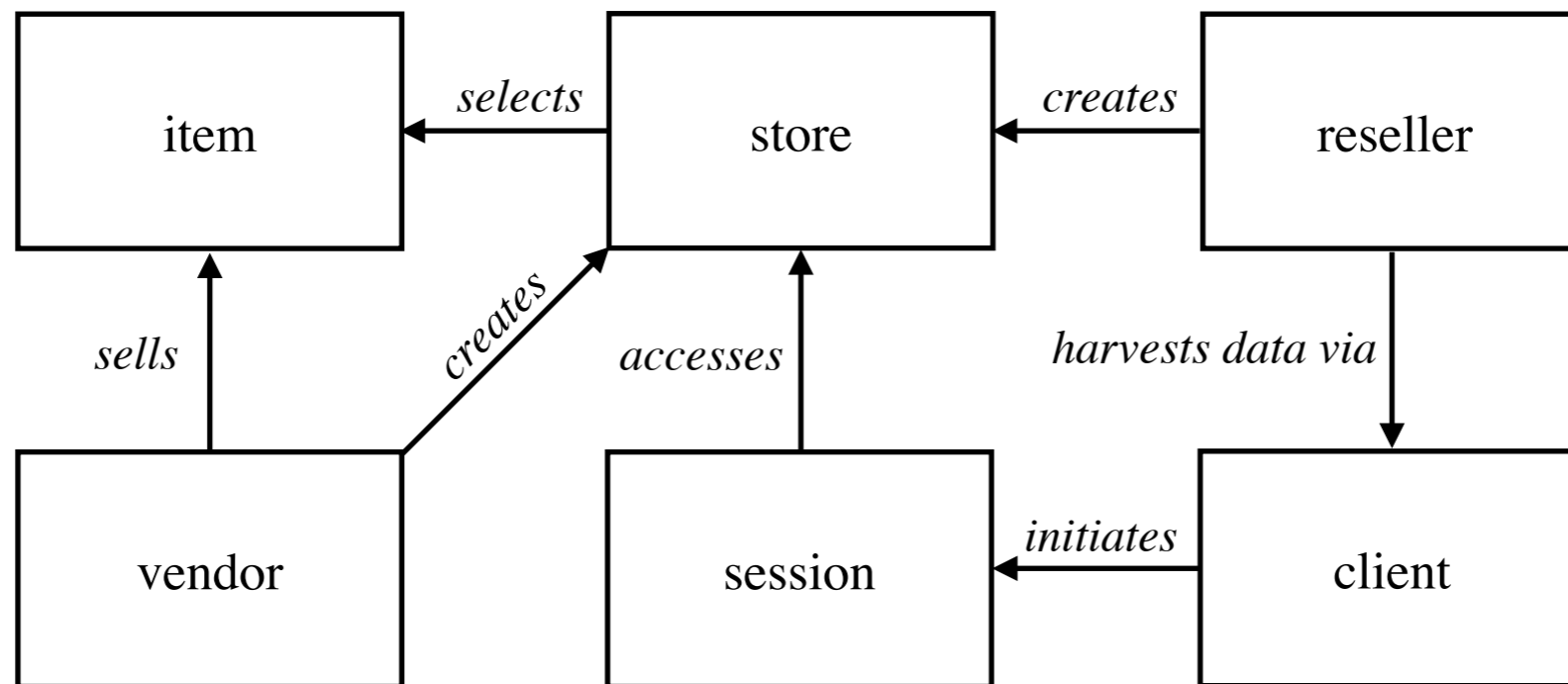
Focus previous Studies
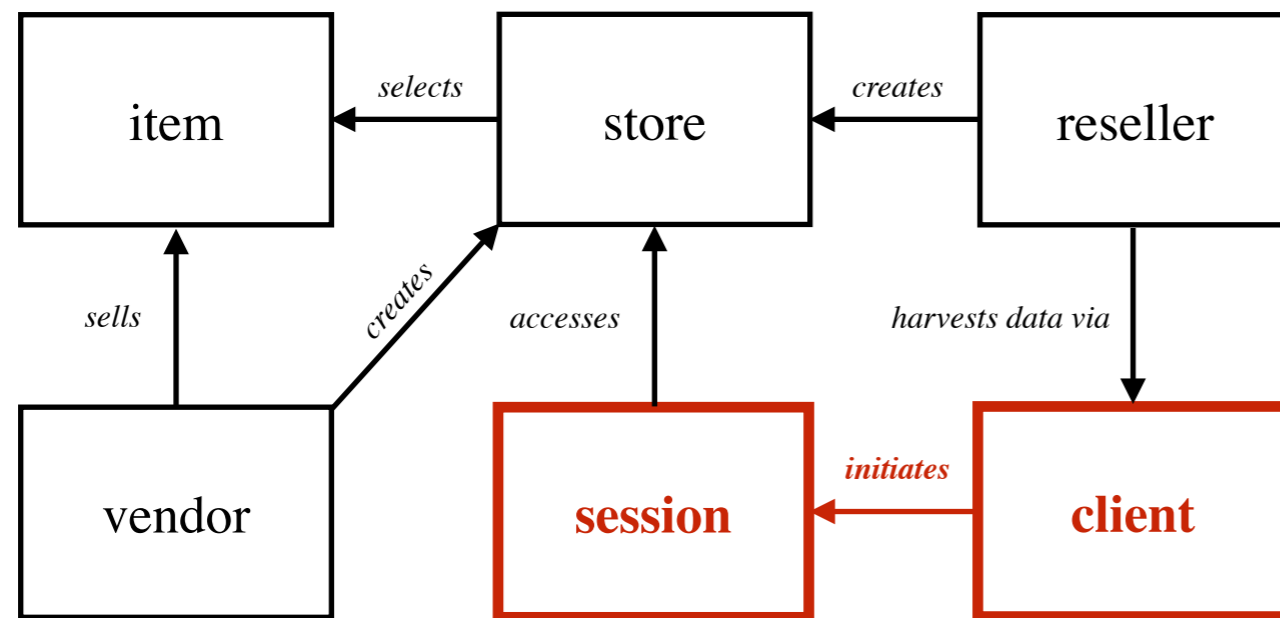
Grouping based on Individual attributes:
- location
- user history
- operation system
- device fingerprint
- …

Our Focus
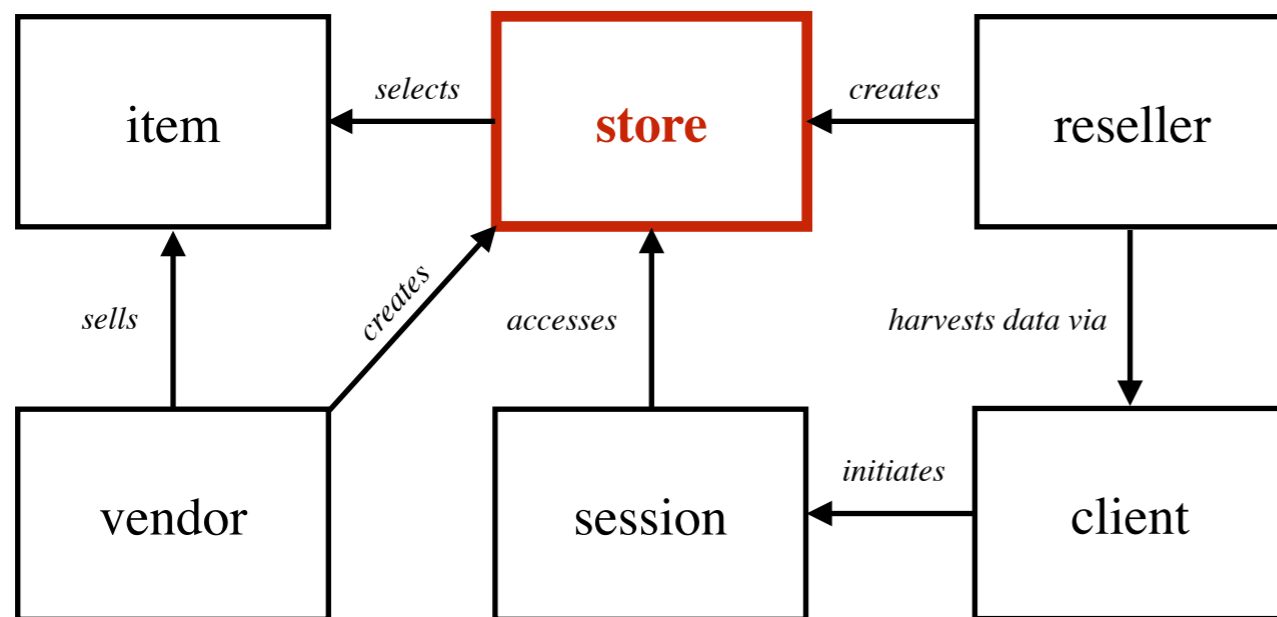
Grouping based on used stores:
- desktop browser
- mobile app
- mobile browser
- localisation
- …

Research Questions

1. Do price differences occur for different stores?
2. Do vendors/re-sellers benefit a specific store?
3. Do any patterns emerge?

Scope:
- In: differences platforms but same vendor
- Out: differences between different vendors
  - ➡ Price comparison portals

Studying store-based pricing

Collection approach

- Previous work

  - Manual
    [Clever Reisen]

  - Crowd-sourcing (manual)
    [MGEL13, HSLMW14, ISSL17]

  - Automated scraping
    [MGEL12, HSLMW14, VNBJ14, HTWH18]

Challenges - Data Acquisition

- Multi-platform data acquisition
  - Faked mobile platforms lead to different outcomes [YY20]
  - Emulators can be unstable and slow

- Eliminating confounding factors
  - User-based features (location, profile, etc.)
  - Synchronicity (prices change over time)
  - Long-time scan (pricing errors, replication inconsistency, etc.

Challenges - Item matching

- More challenging in a multi-platform environment

- Attribute selection

  - Baggage included or not

  - Code share flights (e.g., MH17 = KL4103)

- Normalisation

  - e.g., London Heathrow: LHR, London Heathrow, Heathrow; 9PM=21.00

- Attribute changes

Framework Concept
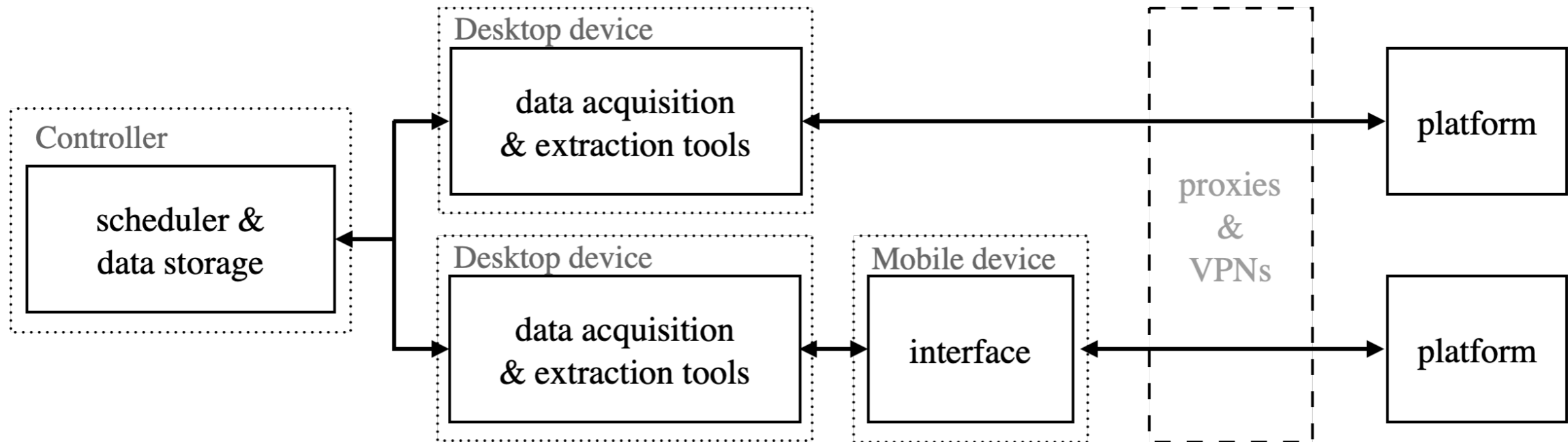
Client Synchronisation
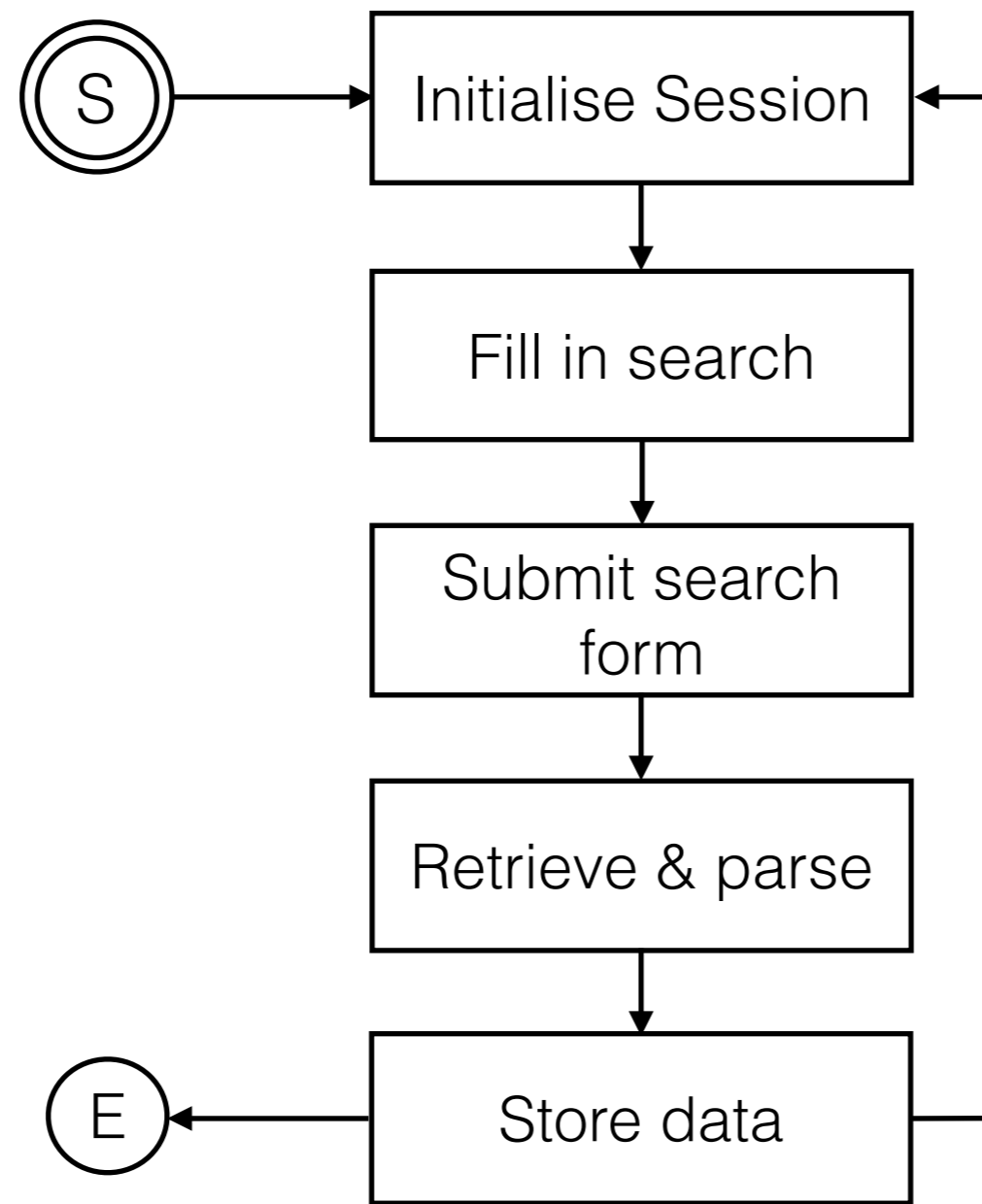
Client Synchronisation
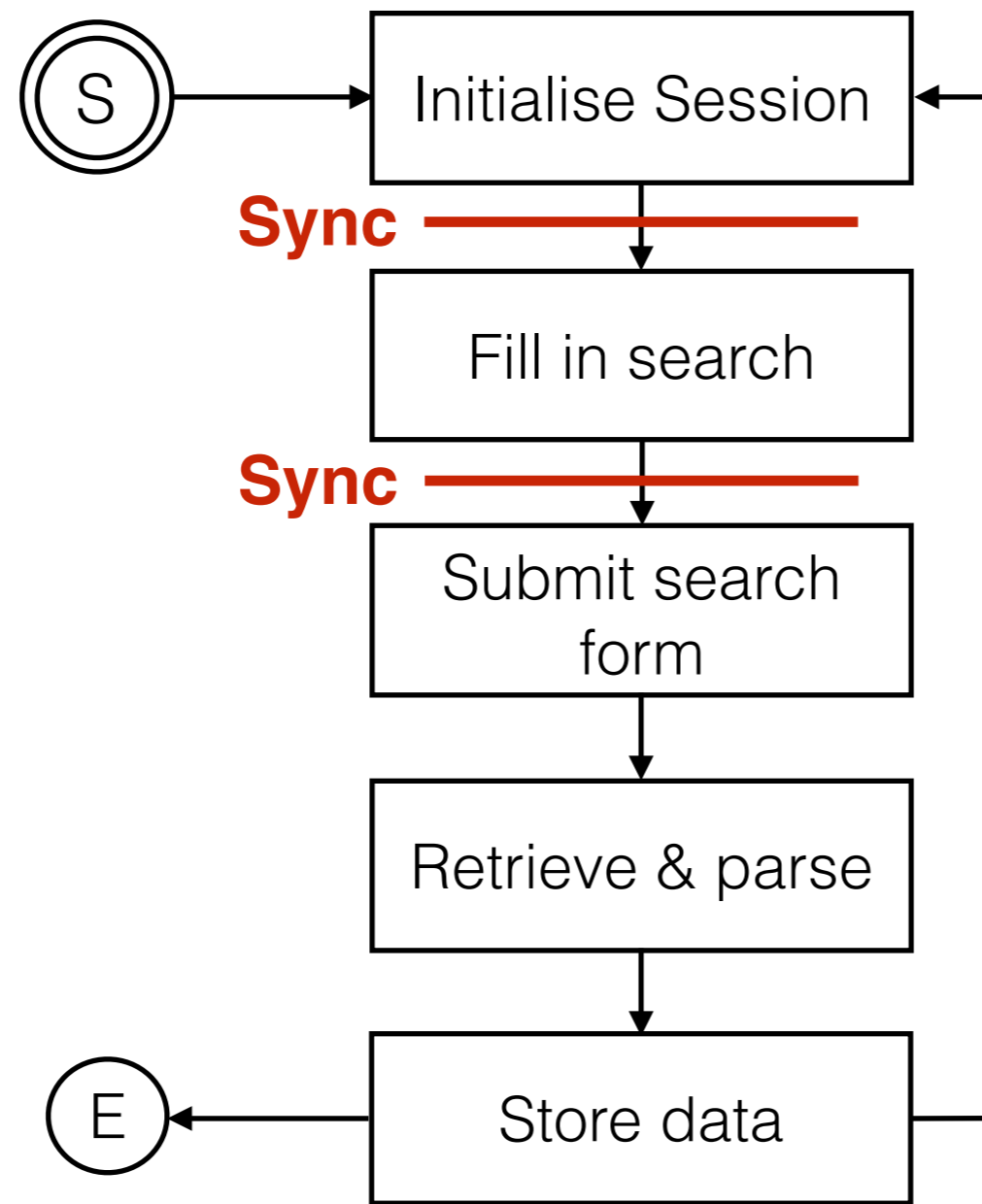
Case Study: Flight Ticket Prices

Data set

company	scrapers
Air France	🖥️📱
Eurowings	🖥️ 🇩🇪 🇫🇷 🖥️📱 🖥️ 🇩🇪 🇫🇷
Expedia	🖥️📱 🖥️ 🇩🇪 🇫🇷
KAYAK	🖥️📱🌐 🖥️📱
Opodo	🖥️📱 🖥️ 🇩🇪 🇫🇷

Data set

company	scrapers	date		orig–dest
Air France	🖥📱	July	01	FRA–CDG
		August	01	FRA–CDG
		August	09	VIE–AMS
	🖥 🇩🇪 🇫🇷	July	01	FRA–CDG
Eurowings	🖥📱	July	11	AMS–HAM
		August	12	CGN–LON
	🖥 🇩🇪 🇫🇷	July	11	AMS–HAM
Expedia	🖥📱	July	01	BRU–AMS
		August	10	AMS–ARN
		August	18	OPO–BRU
	🖥 🇩🇪 🇫🇷	July	01	BRU–AMS
		August	01	BRU–AMS
KAYAK	🖥📱🌐	August	18	OPO–BRU
	🖥📱	August	07	MAD–FCO
		August	13	BER–BCN
Opodo	🖥📱	July	01	FRA–CDG
		August	01	FRA–CDG
		August	23	CGN–PRG
		August	18	OPO–BRU
	🖥 🇩🇪 🇫🇷	July	01	FRA–CDG

3 x per day
45 days period
135 comparisons

Data set

company	scrapers	date		orig–dest	#comps.
Air France	🖥️📱	July	01	FRA–CDG	73
		August	01	FRA–CDG	72
		August	09	VIE–AMS	72
	🖥️ 🇩🇪 🇫🇷	July	01	FRA–CDG	68
Eurowings	🖥️📱	July	11	AMS–HAM	8
		August	12	CGN–LON	7
	🖥️ 🇩🇪 🇫🇷	July	11	AMS–HAM	11
Expedia	🖥️📱	July	01	BRU–AMS	29
		August	10	AMS–ARN	95
		August	18	OPO–BRU	101
	🖥️ 🇩🇪 🇫🇷	July	01	BRU–AMS	74
		August	01	BRU–AMS	83
KAYAK	🖥️📱🌐	August	18	OPO–BRU	71
	🖥️📱	August	07	MAD–FCO	109
		August	13	BER–BCN	101
Opodo	🖥️📱	July	01	FRA–CDG	99
		August	01	FRA–CDG	90
		August	23	CGN–PRG	103
		August	18	OPO–BRU	101
	🖥️ 🇩🇪 🇫🇷	July	01	FRA–CDG	101

Data set

company	scrapers	date		orig–dest	#comps.	#trips	
Air France	🖥📱	July	01	FRA–CDG	73	2	(2)
		August	01	FRA–CDG	72	2	(2)
		August	09	VIE–AMS	72	3	(3)
	🖥🇩🇪🇫🇷	July	01	FRA–CDG	68	2	(2)
Eurowings	🖥📱	July	11	AMS–HAM	8	1	(1)
		August	12	CGN–LON	7	3	(0)
	🖥🇩🇪🇫🇷	July	11	AMS–HAM	11	1	(1)
Expedia	🖥📱	July	01	BRU–AMS	29	24	(3)
		August	10	AMS–ARN	95	7	(6)
		August	18	OPO–BRU	101	20	(6)
	🖥🇩🇪🇫🇷	July	01	BRU–AMS	74	5	(4)
		August	01	BRU–AMS	83	4	(4)
KAYAK	🖥📱🌐	August	18	OPO–BRU	71	154	(4)
	🖥📱	August	07	MAD–FCO	109	247	(13)
		August	13	BER–BCN	101	273	(6)
Opodo	🖥📱	July	01	FRA–CDG	99	9	(9)
		August	01	FRA–CDG	90	18	(7)
		August	23	CGN–PRG	103	16	(1)
		August	18	OPO–BRU	101	17	(4)
	🖥🇩🇪🇫🇷	July	01	FRA–CDG	101	9	(9)

Data set

company	scrapers	date		orig–dest	#comps.	#trips	
Air France	🖥📱	July	01	FRA–CDG	73	2	(2)
		August	01	FRA–CDG	72	2	(2)
		August	09	VIE–AMS	72	3	(3)
	🖥🇩🇪🇫🇷	July	01	FRA–CDG	68	2	(2)
Eurowings	🖥📱	July	11	AMS–HAM	8	1	(1)
		August	12	CGN–LON	7	3	(0)
	🖥🇩🇪🇫🇷	July	11	AMS–HAM	11	1	(1)
Expedia	🖥📱	July	01	BRU–AMS	29	24	(3)
		August	10	AMS–ARN	95	7	(6)
		August	18	OPO–BRU	101	20	(6)
	🖥🇩🇪🇫🇷	July	01	BRU–AMS	74	5	(4)
		August	01	BRU–AMS	83	4	(4)
KAYAK	🖥📱🌐	August	18	OPO–BRU	71	154	(4)
	🖥📱	August	07	MAD–FCO	109	247	(13)
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	🖥🇩🇪🇫🇷	July	01	FRA–CDG	101	9	(9)

Data set

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Air France		July	01	FRA–CDG	73	2	(2)
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		August	09	VIE–AMS	72	3	(3)
		July	01	FRA–CDG	68	2	(2)
Eurowings		July	11	AMS–HAM	8	1	(1)
		August	12	CGN–LON	7	3	(0)
		July	11	AMS–HAM	11	1	(1)
Expedia		July	01	BRU–AMS	29	24	(3)
		August	10	AMS–ARN	95	7	(6)
		August	18	OPO–BRU	101	20	(6)
		July	01	BRU–AMS	74	5	(4)
		August	01	BRU–AMS	83	4	(4)
KAYAK		August	18	OPO–BRU	71	**154**	**(4)**
		August	07	MAD–FCO	109	**247**	**(13)**
		August	13	BER–BCN	101	**273**	**(6)**
Opodo		July	01	FRA–CDG	99	9	(9)
		August	01	FRA–CDG	90	18	(7)
		August	23	CGN–PRG	103	16	(1)
		August	18	OPO–BRU	101	17	(4)
		July	01	FRA–CDG	101	9	(9)

Analysis: Store-based pricing in the wild

Expected and observed result
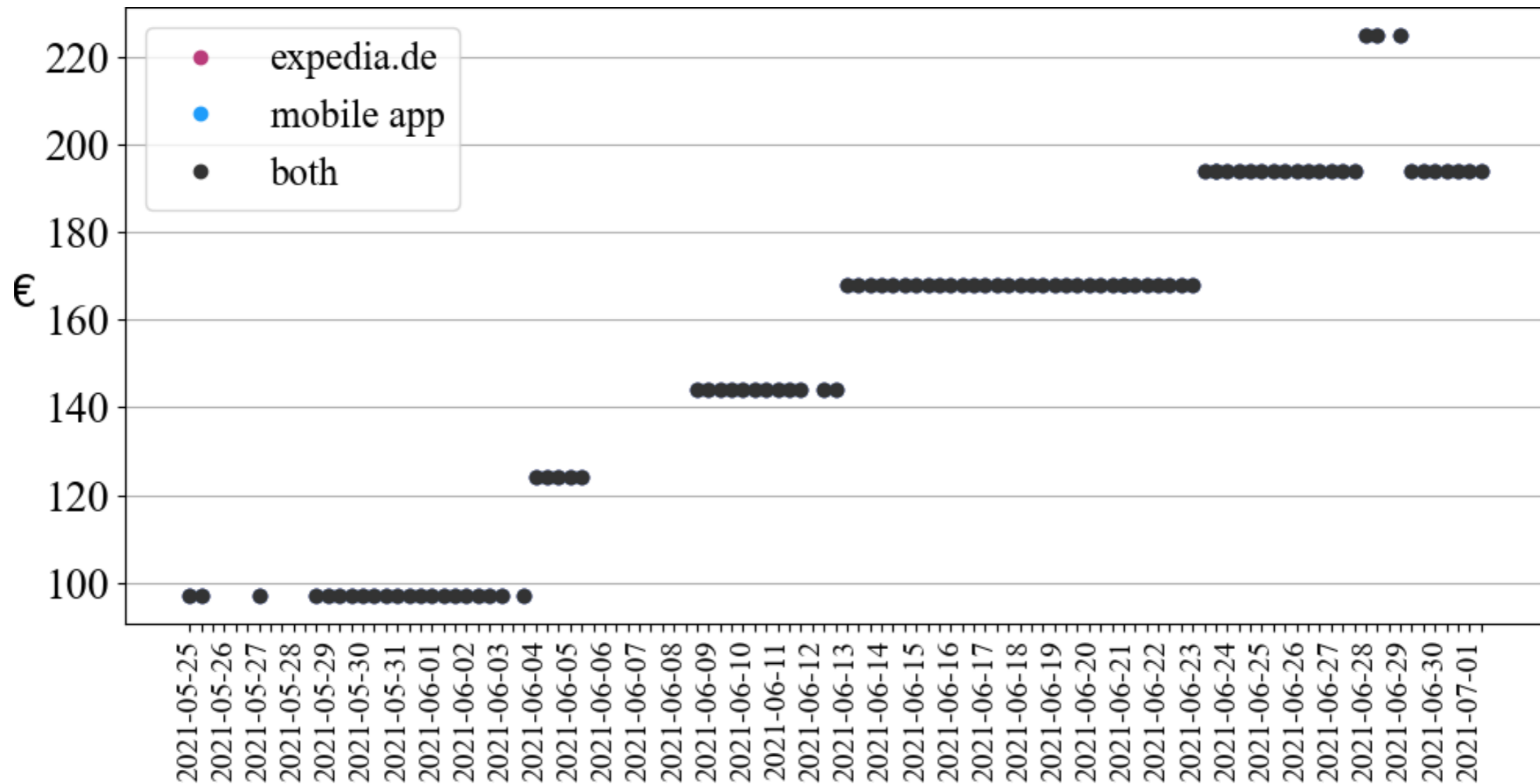
High-level view
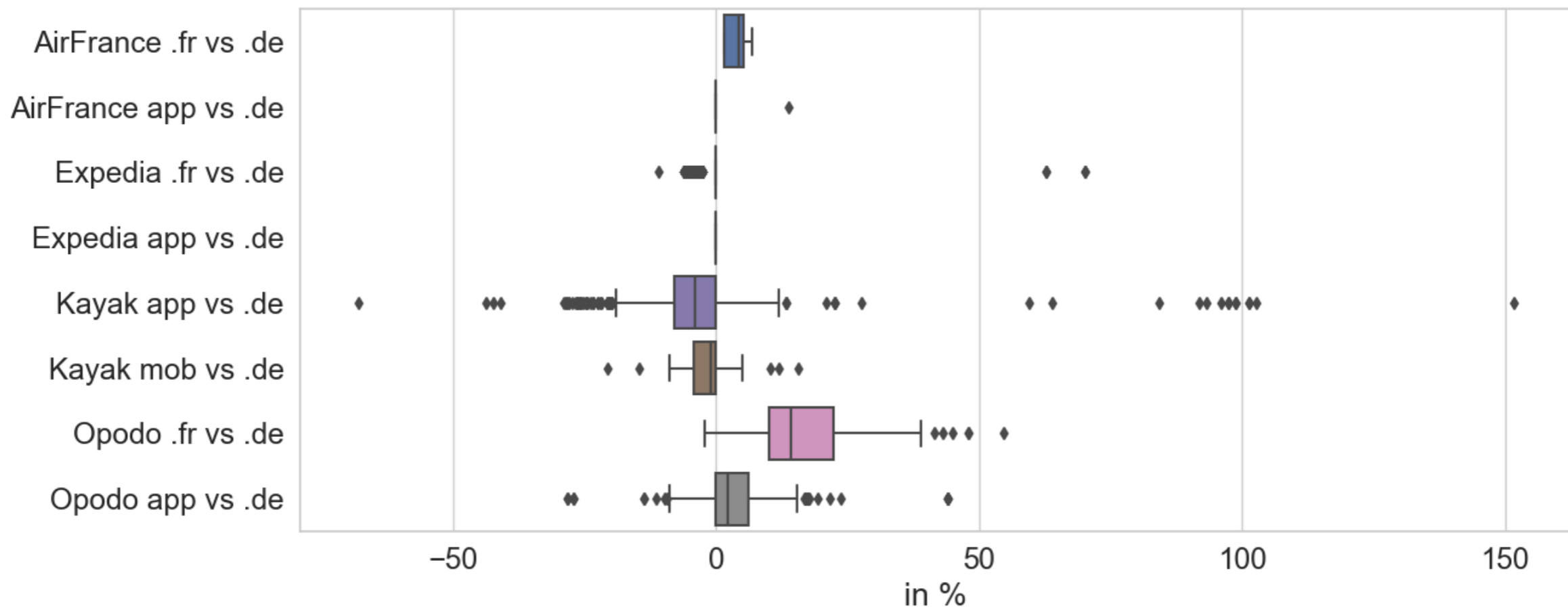
High-level view
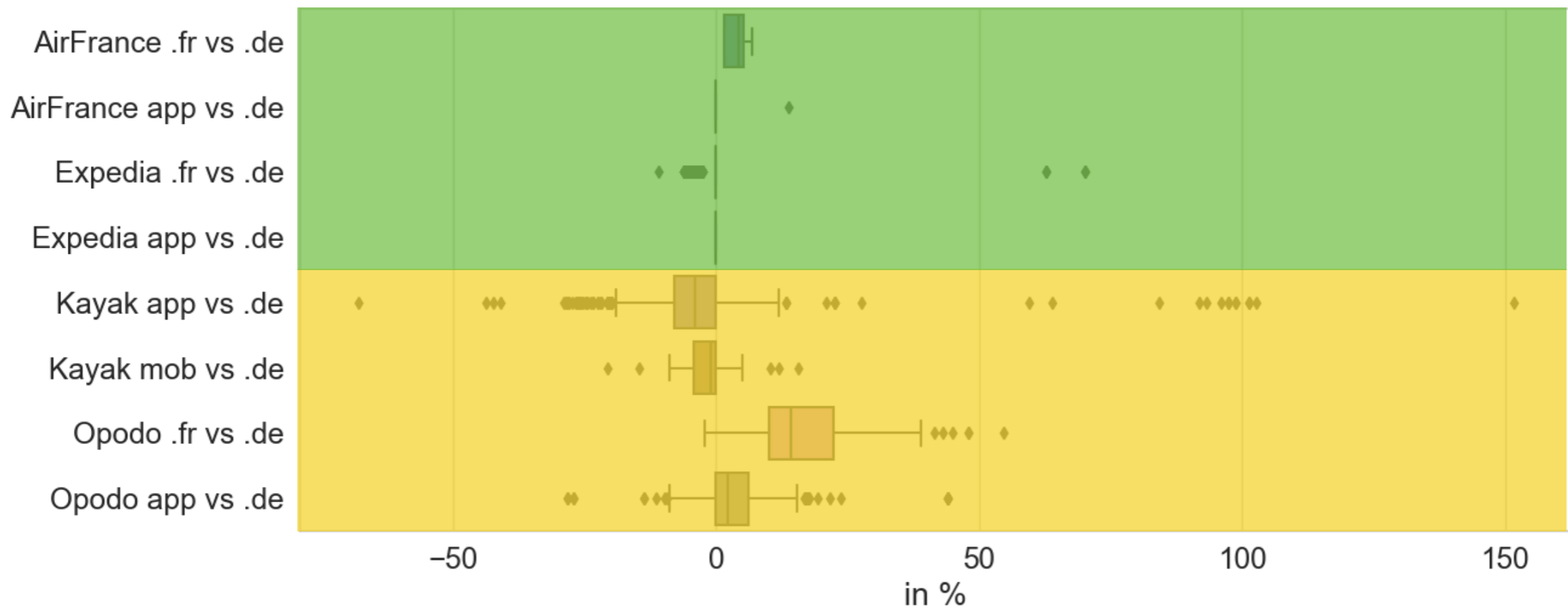
High-level view
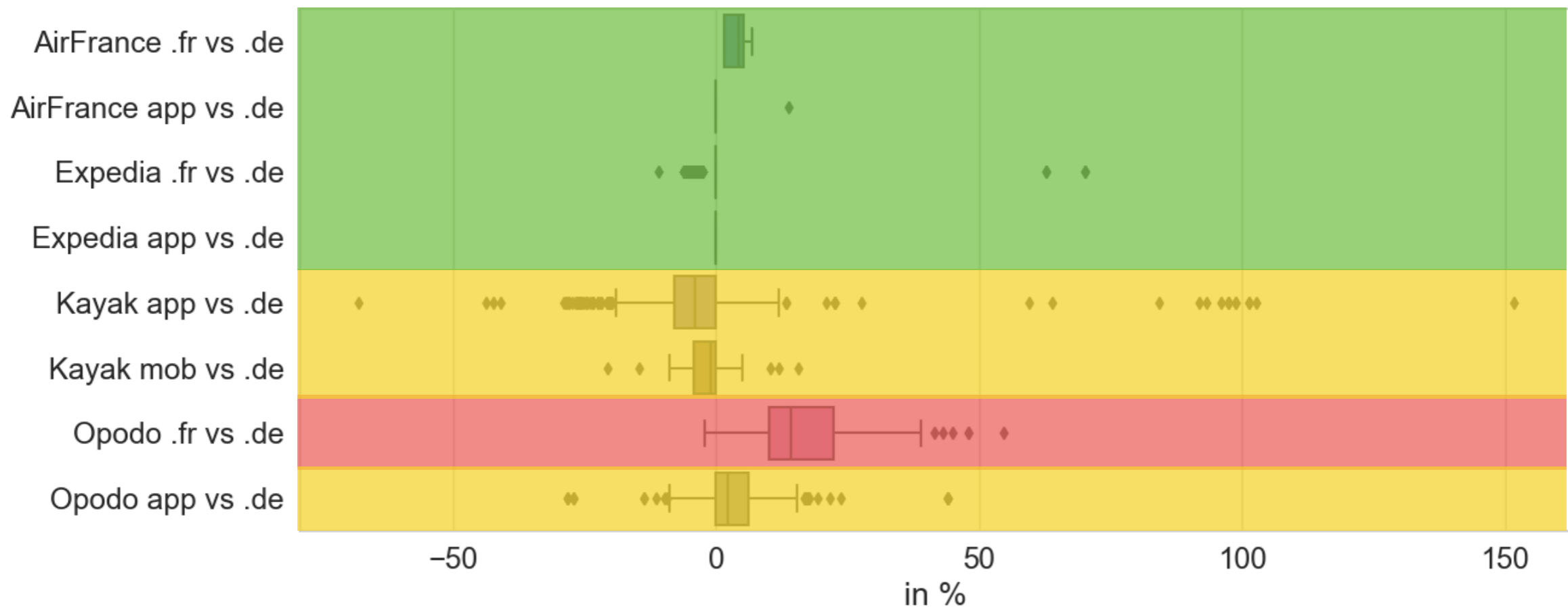
Zoom in on Opodo
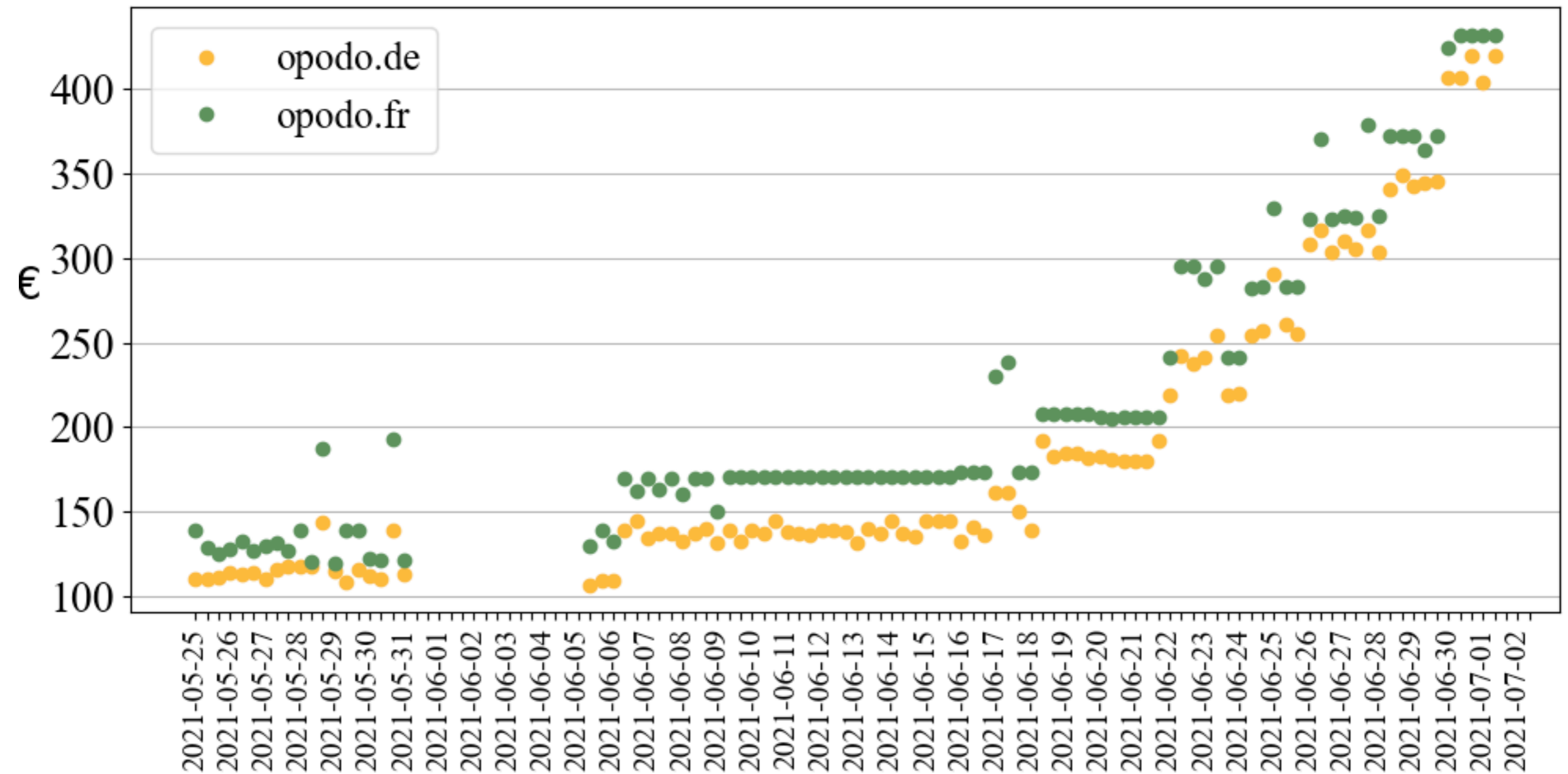
Are there any patterns?

AirFrance .fr
AirFrance app
Expedia .fr
Expedia app
Kayak app
Kayak mob
Opodo .fr
Opodo app

25 May   05 Jun   15 Jun   25 Jun   04 Jul

Break down Opodo app

Break down Opodo app

Platform switching can be very lucrative
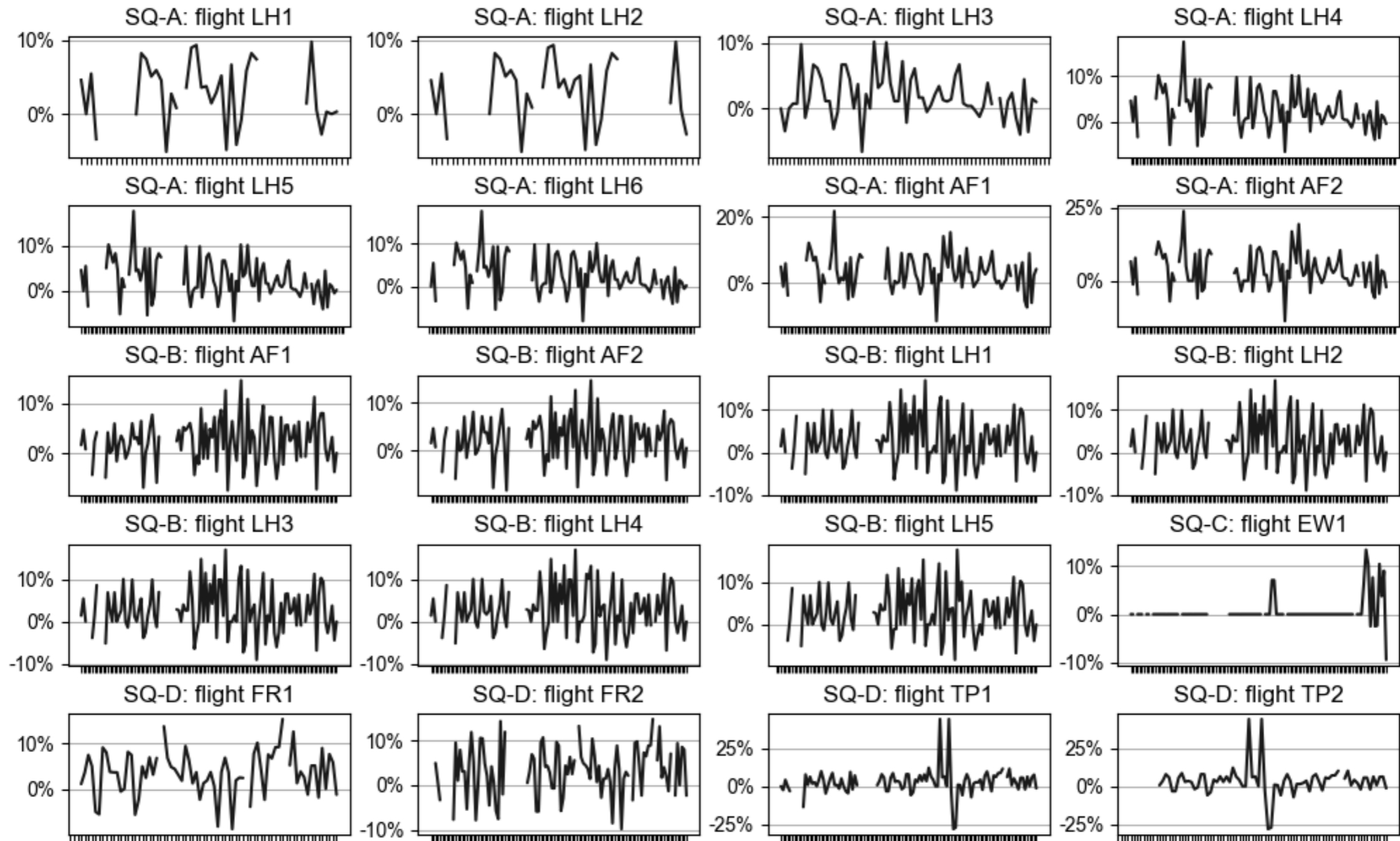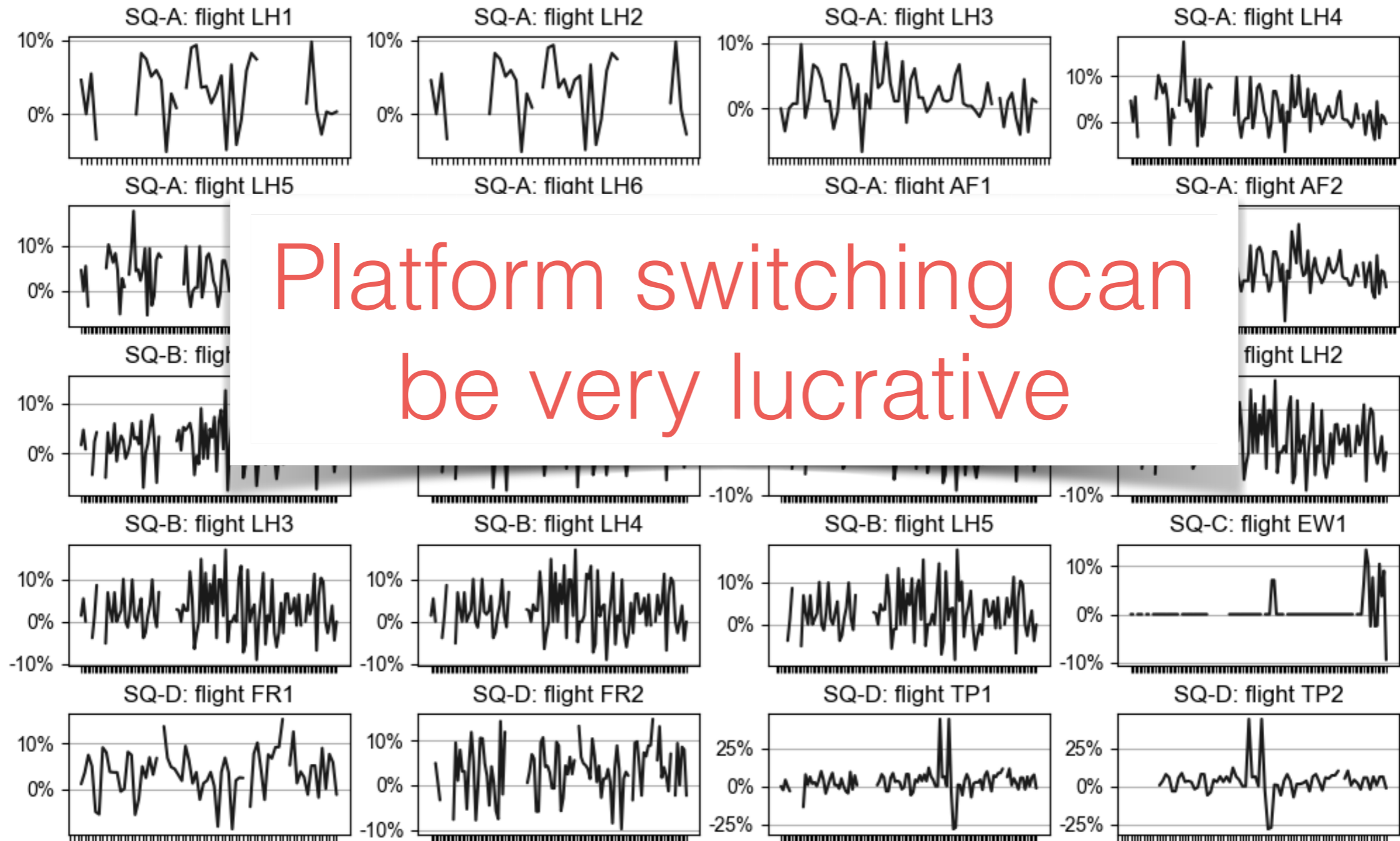
AirFrance Localisation

AirFrance Localisation

Last minute pricing may play a role

Discussion & Summary

Alternative Explanations

- Are there tax differences?

- Variations due to different data centres?

- Do our automated search queries influence the outcome?

- Is there A/B-Testing?

Alternative Explanations

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Alternative Explanations

- Are there tax differences? ❌

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- Do our automated search queries influence the outcome?

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Alternative Explanations

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- Is there A/B-Testing?

Alternative Explanations

- Are there tax differences? ✖

- Variations due to different data centres? ➖

- Do our automated search queries influence the outcome? ➖

- Is there A/B-Testing? ➖

Conclusion

- First systematic investigation of store-based pricing

- Interesting field to expand
  - Price differences occur frequently
  - Some vendors show strong indications for store-specific prices
  - Strangely, customer loyalty is not always rewarded (e.g. Opodo app)

- Data acquisition is difficult (scale in store, stability, and costs)

Questions

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