

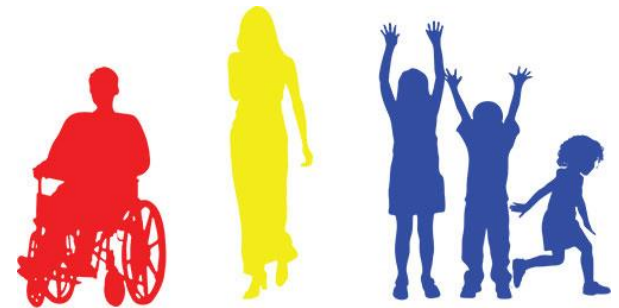
# Investigating Personalized Price Discrimination of Textile-, Electronics- and General Stores in German Online Retail

14th International Conference on Wirtschaftsinformatik

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25.02.2019

# Introduction

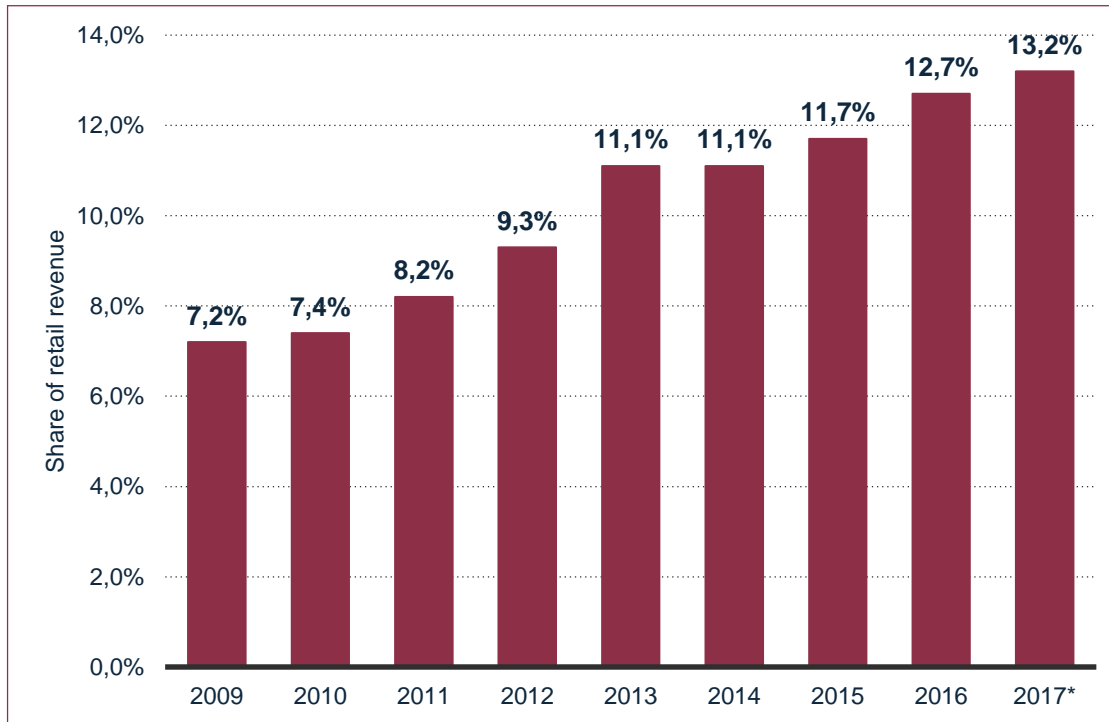
- The trend of personalization in online retail is on rise
- Personalized price discrimination as particular case of personalization
- The debate on price discrimination – concerns of privacy, tracking and consumer protection
- It is vital to uncover discriminatory practices in order to make interactions with online retailers transparent



# Background

## Share of e-commerce in total retail revenue in Germany from 2009 to 2017

Share of e-commerce in retail revenue in Germany 2009-2017



- E-commerce market in Germany shows continuous growth
- Possibilities to use data to gain insights are expanding

Note: Germany; 2009 to 2017

Further information regarding this statistic can be found on [page 8](#).

Source(s): bevhi; [ID 453490](#)

# Background

Price Discrimination - a variation of price cost ratio across units or groups of buyers

*K. Carroll and D. Coates (1999)*

The producer sets varying prices, which includes discounts, for an identical product or service for different consumers based on the consumer's characteristics, the time or location of purchase, the amount of purchase, or other relevant information.

*by A. Krämer, R. Kalka, and N. Ziehe*

*(2016), K. D. Hoffman, L. W. Turley, and S. W. Kelley (2002), Y. Lii and E. Sy (2009) & K. Carroll and D. Coates (1999)*

# Background



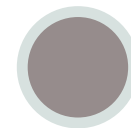
## 3rd degree

- segmentation using sociodemographic information
- e.g. students of senior citizen discounts



## 2nd degree

- depends on **amount** or **quality** of a given product or service
- consumers' self-selection of **amount** or **quality**
- e.g. discount based on volumes, airfares (business, premium)



## 1st degree

- requires the maximum possible characteristics of the customer
- the price is personalized and based on customer characteristics



# Data Sourcing For Price Discrimination



# Related works

Authors	Approach	Locality	Results
Mikians (2012)	simulated browser fingerprints and user profiles	US online retail	Instances by system, sociodemographic and behavioral criteria
Hannak (2014)	using Amazon MTurk and simulated user profiles	US online retail; tourism	Instances in system and behavioral criteria
Vissers (2014)	simulated browser fingerprints and user profiles	Worldwide; tourism	No price discrimination
Schleusener and Hosell (2015)	manual approach	Germany; tourism	Instances by geographic and system criteria
Kraemer (2016)	manual approach	Germany; tourism	Instances by system criteria
Hupperich (2018)	simulated browser fingerprints and user profiles	Worldwide; tourism	Few instances by geographic criteria

# Research Motivation

- The findings of previous studies are inconclusive
  - only two studies focus on the German online retail market
  - price discrimination has been found in particular fields (e.g. tourism)
  
- Need for more evidence for a public debate on price discrimination in Germany



# Research Questions

Do textile-, electronics- and general stores in the German online retail market perform any personalized pricing activities?

(What tracked characteristics lead to a change in price?)

# Selected Online Shops

(Revenue in Million EUR in 2015)<sup>1</sup>

Shop	Revenue	Sector
amazon.de	7.790,60	General
otto.de	2.300,00	General
zalando.de	1.031,80	Textile
notebooksbilliger.de	610,90	Electronic
cyberport.de	491,30	Electronic
bonprix.de	484,70	Textile
tchibo.de	450,00	General
conrad.de	433,20	General
alternate.de	376,70	General
hm.de	344,60	Textile
esprit.de	342,00	Textile

# Research Design

## Discourse analysis

Analysis of public information on the selected shops, shop software vendors, tracking providers

## Manual checking and survey

Students used their personal devices to check prices in each shop manually and then filled out the survey based on the information from discourse analysis

## Automated software crawler

Simulation of user activity and user profiles, to check the prices in the each shop automatically

# Discourse analysis

- investigated prevalent trackers and three biggest standard shop software
- observed the involved actors and their activities
- evaluated on how and why they track the information of consumers in their services
- evaluated their websites for tracking functionality, consumer segmentation and price discrimination;
- contacted directly and assess available third party addons

*“Due to the EU-GDPR, we would like to inquire, whether and in which way personal data influences the determination of visible prices, including potential discounts or vouchers (also via mail or email), in your online shop.”*

## Trackers



## Shop software



# Survey

Round			Group	Size	Survey Items	
1 <sup>st</sup>			International students	12	Age	Manufacturer
			PhD students	14	Gender	Hobby
2 <sup>nd</sup>			Bachelor students	13	Device Type	Previous Visits
			Bachelor students	13	Operating System	Previous Purchases
3 <sup>rd</sup>			Bachelor students	22	Language	Social Media Logins
			Bachelor students	22	Apps	

- 20 selected products with their own devices
- browser settings, and accounts and filled out the survey accordingly
- used proxies and VPNs, but the most common -University WiFi and mobile data

# Automated software crawler

Profile Keywords		Website Engagement Actions	
Profile1	Frankfurt Football	twitter	click and like
Profile2	Tennis Dortmund	reddit	click, like and subscribe
Profile3	Horseriding München	facebook	click, view and like
Profile4	Cooking News	google	click, scroll and wait
Profile5	Gucci Rolex	bild	click, scroll and wait
		youtube	click, view and like

# Findings: Discourse analysis

Players in Tracking and Targeted Analytics. Legend:  
Google Analytics 360<sup>G</sup>, Facebook Analytics<sup>F</sup>, Amazon Pinpoint<sup>P</sup>,  
Adobe Target<sup>T</sup>, Optimizely<sup>O</sup>, SAP Hybris Marketing Cloud<sup>H</sup>.

Main Service	Data Management Platform <sup>G</sup> , Advertising <sup>G,F,O</sup> , Marketing Solution <sup>T,H</sup>
Data Sources	Internal <sup>G,F,P,T,O,H</sup> , Across Tools <sup>G,P</sup> , External <sup>G,F,P,T,O,H</sup>
Sociodemographic	Age <sup>G,F,P</sup> , Gender <sup>G,F</sup> , Location <sup>G,F,P,T,O</sup> , Name <sup>H</sup> , Address <sup>H</sup> , Other <sup>H</sup>
Behavioral	Surf History <sup>G,P,O</sup> , Lifestyle <sup>G,P,H</sup> , Interests <sup>G,P,H</sup> , # of Visits <sup>P</sup> , Time of Visit <sup>T,O</sup> , Referrer <sup>O</sup> , Purchases <sup>T,H</sup> , Payments <sup>T,H</sup> , Clicked ads <sup>G</sup> , On-site Activity <sup>O,H</sup>
System	IP address <sup>G,F,T,O</sup> , Device <sup>G,P,O</sup> , Manufacturer <sup>P,O</sup> , Browser <sup>F,T,O</sup> , Operating System <sup>F,P,T,O</sup> , Screen size <sup>T</sup> , Language <sup>T,O</sup>
Purpose	Segmentation <sup>G,P,O,H</sup> , Ad Effectiveness <sup>F,T,O,H</sup> , Engagement <sup>T,O,H</sup> , Site Optimization <sup>T,O</sup> , Loyalty Management <sup>T,H</sup>

# Findings: Discourse analysis

- online retailers (**7**) denied usage of discrimination activities
- **Otto.de**, **Bonprix.de**, **Hm.de** and **Amazon.de** did not answer the mail at all
- **Tchibo.de** and **Esprit.de** state that they select consumers for discounts and gifts based on personal data and previous purchases



# Findings: Survey

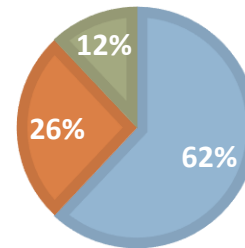
## DESCRIPTIVE STATISTICS:

**N=61**

**AGE M=24.84; SD=4.5**

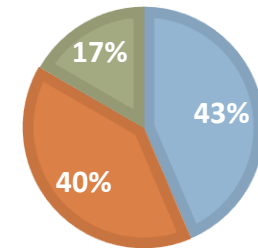
## LANGUAGE

■ German ■ English ■ Other

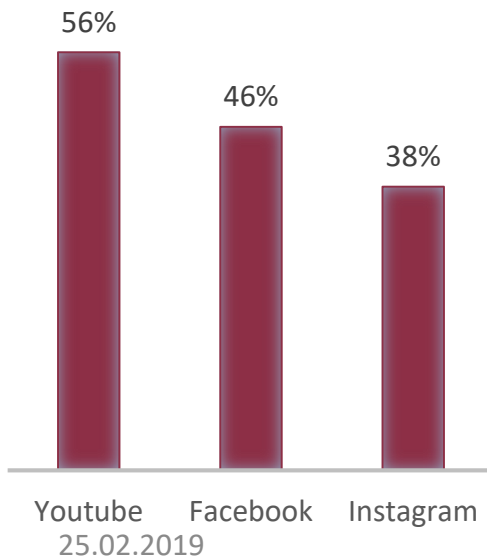


## DEVICE TYPE

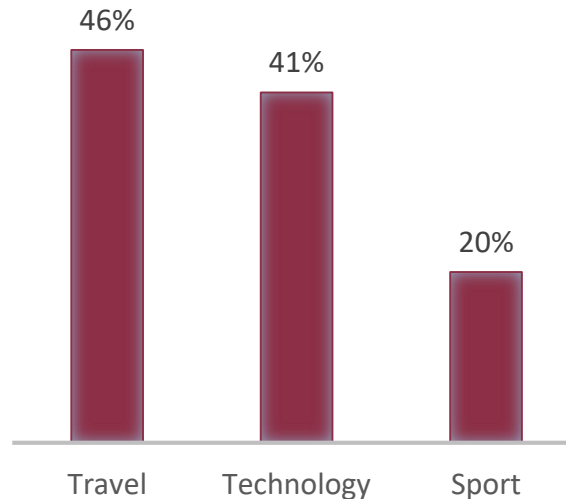
■ Windows ■ Android ■ iOS



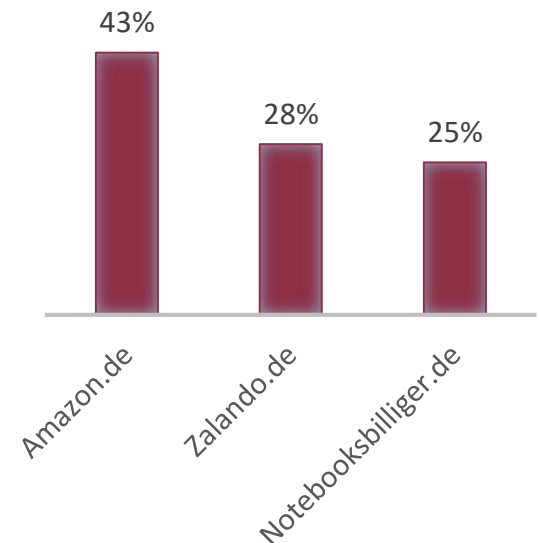
## TOP INSTALLED APPS



## MOST SELECTED HOBBIES



## MOST VISITED SHOPS



# Findings: Survey

## 1<sup>st</sup> round 26 students

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- For four distinct users, prices differed by 9.00 EUR, 2.00 EUR, 0.05 EUR and 0.09 EUR on **Otto.de**, **Zalando.de** and **Cyberport.de**
- For the biggest differences - 9.00 EUR, 2.00 EUR - the model and language variables were distinct from the other test persons

## 2<sup>nd</sup> round 13 students

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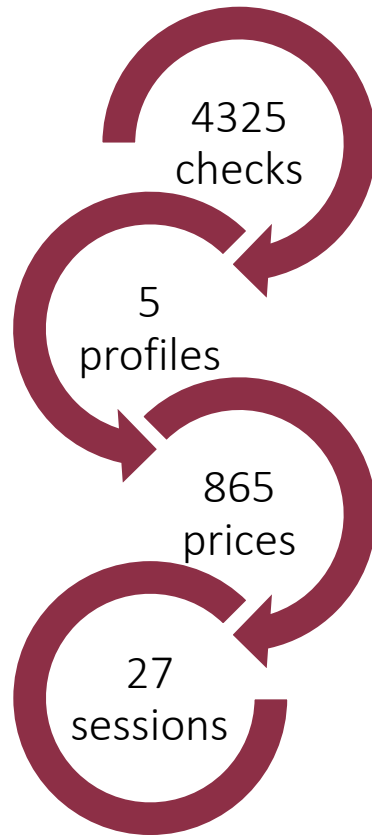
- showed two differences in prices at 0.05 EUR and 0.60 EUR for **Tchibo.de** and **Alternate.de**

## 3<sup>rd</sup> round 22 students

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- only one instance of price differentiation by 0.10 EUR on **Amazon.de**

# Findings: Software crawler



Apart from software errors, when the website layout changed and the scraper failed to extract the correct price, we **did not find** a single difference in prices in the entire data set for any of the selected products and shops.

\*The shops Notebooksbilliger.de, Hm.de and Conrad.de are missing in the results due to their bot protection.

25.02.2019

# Discussion

- Personalized price discrimination is not widely used in observed online shops
  - insufficient cases of price differentiation – 7 instances in the 900+ cases
- The implementation of price discrimination practices is feasible, however is not widely employed:
  - Economical reasons
  - Risk of losing the trust of consumers
  - Consumer protection initiatives

# Limitations

Discourse  
analysis:

- The discourse analysis is limited to the official documentation, references and responses of the players

Survey method:

- The colocation of the survey participants and the usage of University Wi-Fi
- Some participants made errors while transcribing prices
- Restricted by the sample size

Software crawler  
method:

- The crawler was detected by several shops as a bot
- Used free proxies, which might be blacklisted and negatively affect the price scraping
- Restricted by the sample size

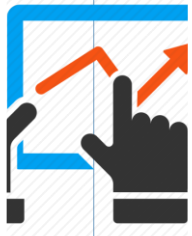
# Further research

- explore reasons using expert interviews
- improve crawler and sample size

# Thank you for your attention!

Questions?

# Conditions for Price Discrimination



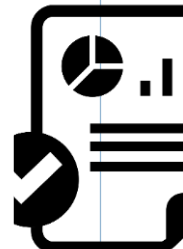
firm needs some market power, or consumers buy elsewhere



firm needs to control the sale of the product or service to set the price



the consumers' willingness to pay must differ from one another



sufficient information about consumers to distinguish them into segments must be available



# Consumer perspective



- Consumer awareness regarding tracking is growing
- The growing data collection and the lack of transparency on what consequences particular information has, lead to privacy issues and may unsettle consumers
- Consumers can only believe the privacy statements, which are mandated since the EU-GDPR and given by online shops, as there are no (easy) neutral ways to check for personalized price discrimination