Big Data in the Platform Economy

Big Data, Targeting, Competition and Privacy

Wouter Vergote

CEREC Université Saint-Louis Bruxelles and
CORE Université catholique de Louvain

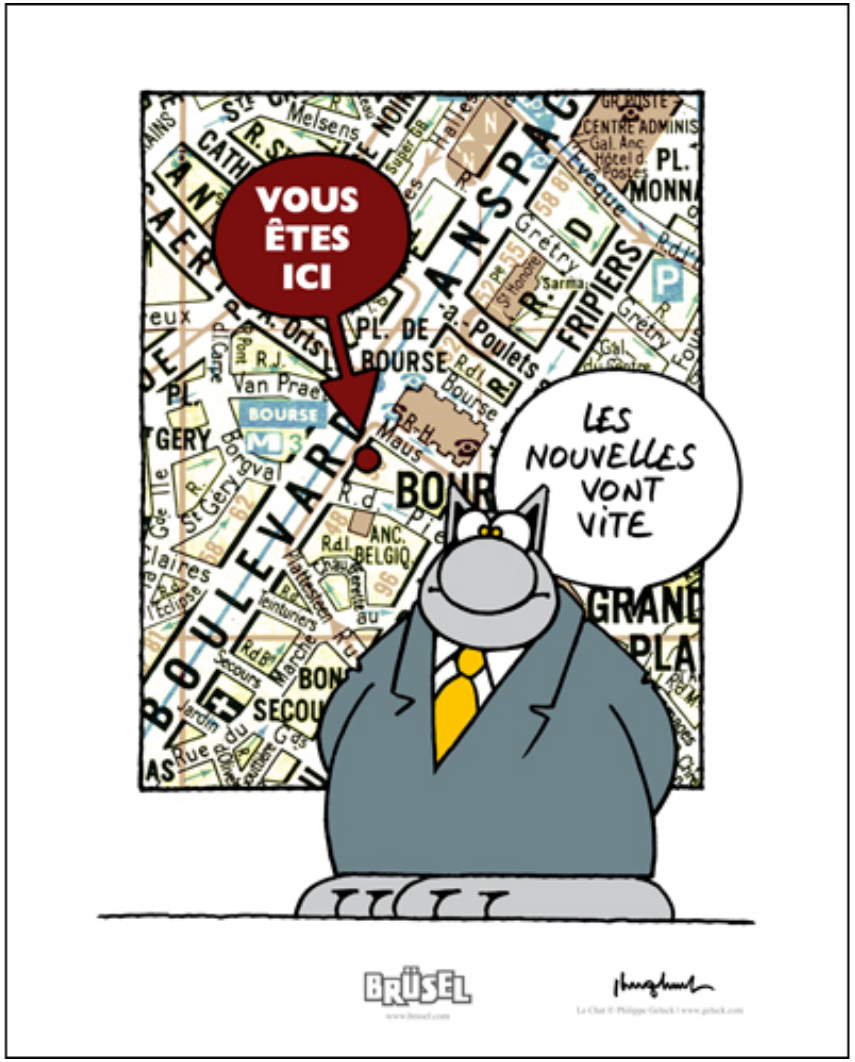
Brussels, May 13 2016

Today's talk

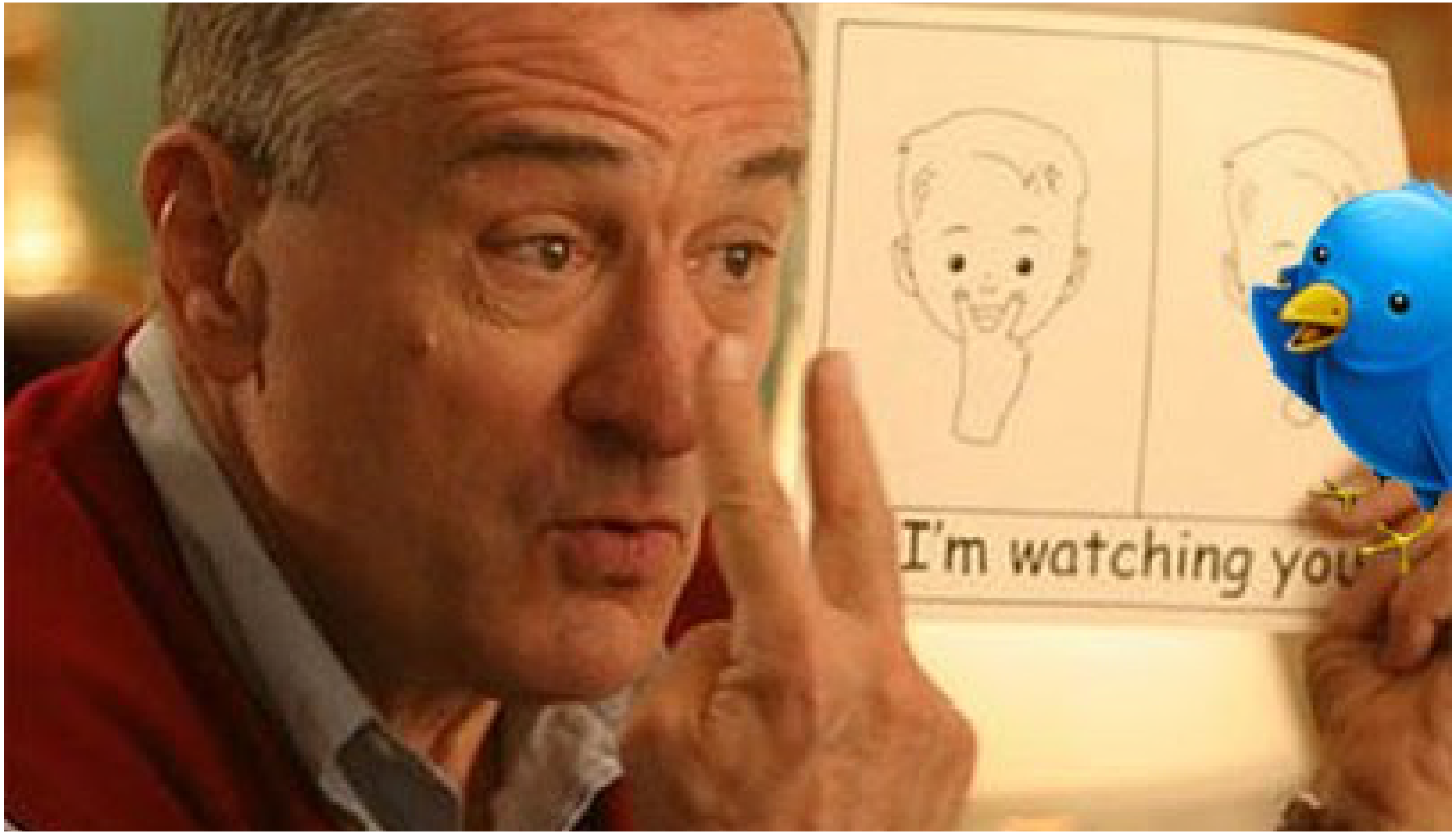
- Big Data enhances price discrimination

- Bad news for consumers?
  - Monopoly
    - Effects of privacy
  - Competition
  - Behavior based price discrimination
    - Quid?
    - Old and new issues

The power of big data…



The power of big data…



Big data and price discrimination

Big brother is no doubt watching you … but **firms as well !!**

"The darker version of online marketing is that it can facilitate what economists call "price discrimination" selling the same exact good at a variety of prices, often in ways unknown to the buyers. This is based on the reality that people have different maximum prices that they are willing to pay, a so-called ***"pain point"*** *after which they won't buy the product. The ideal for a seller would be to sell a product to each customer at their individual "pain point" price without them knowing that any other deal is available."* (Newman, 2014)

One of the important challenges and opportunities raised by big data is the ability for firms to better tailor prices (or advertising) to consumers.

Question: How does the use of more information about the consumers affect individuals and firms in a competitive setting?

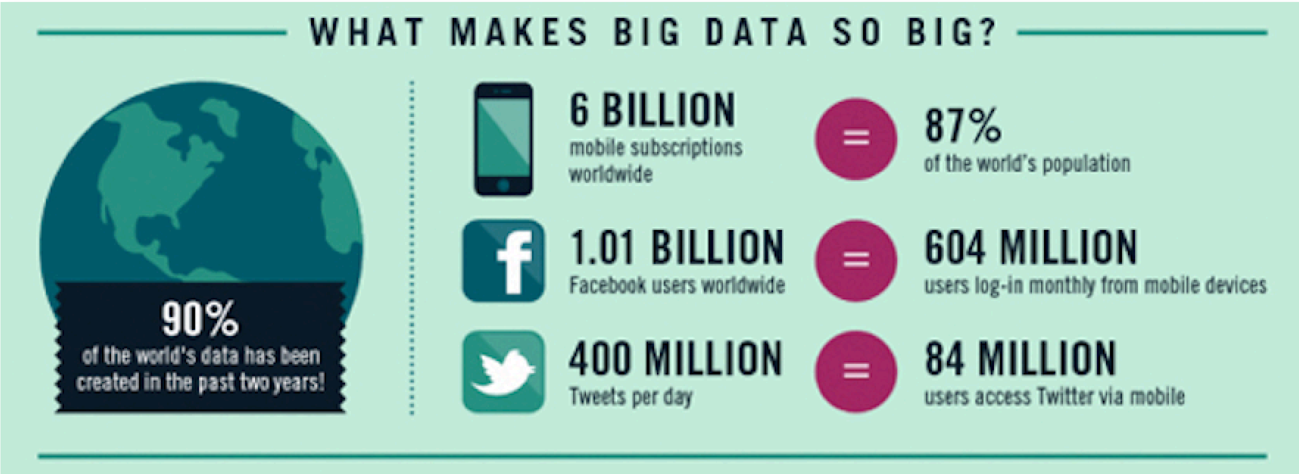
Big data and price discrimination

"Person-specific pricing had until recently rarely been observed. The reason, that reservation values were unobtainable, may no longer be true now that massive datasets tracking detailed individual behavior exist. ... I show demographics, which in the past could be used to personalize prices, poorly predict which consumers subscribe to Netflix. By contrast, modern web-browsing data, [...]- do substantially better." (Shiller, 2014)

Is Big Brother worried?

In a competitive market with transparent pricing, the benefits (of differential pricing) are likely to outweigh the costs. (...) Some studies even suggest that differential pricing can intensify competition relative to uniform pricing, by allowing high-margin sellers to compete more aggressively for price-sensitive customers who might otherwise buy from a lower-priced rival. **(Executive office of the President of the United States, 2015**)

Big data (2)


WHAT MAKES BIG DATA SO BIG?
90%
of the world's data has been created in the past two years!
6 BILLION
mobile subscriptions worldwide
=
87%
of the world's population
1.01 BILLION
Facebook users worldwide
=
604 MILLION
users log-in monthly from mobile devices
400 MILLION
Tweets per day
=
84 MILLION
users access Twitter via mobile


DATA DETAILS
Retailers view Big Data along two different constructs.
Structured:
NAME
Address
DATE OF BIRTH
TRANSACTIONS
AMOUNTS
Loyalty Points, etc.
Semi-Structured/Unstructured:
PRODUCT REVIEWS
TWEETS
"Likes"
IMAGES, ETC.

Big data & digital footprints

- Increasing 'datafication' of the world: everything we do is increasingly leaving a digital trace: ➔ digital footprint
  - Activity data
    - Using one's smartphone, listening to music, … are generating data.
  - Conversation data
    - Most of our conversations (email, social chat, phones) leave a digital trail.
  - Photo and video image data
    - Uploaded, e.g., on Facebook, Instagram or YouTube
  - Sensor Data
    - We are increasingly surrounded by sensors that collect and share data.
  - "Internet of Things" data
    - Smart TVs, watches, alarms, fridges, … are able to collect and process data

- Increasing ability to understand digital footprints
  - Via cloud computing, distributed systems, new analysis approaches.

How to value big data?

Source: Marr, B. (2014) What is Big Data? Slide presentation, Advanced Performance Institute.

The 'Datafication' of our World;

- Activities
- Conversations
- Words
- Voice
- Social Media
- Browser logs
- Photos
- Videos
- Sensors
- Etc.

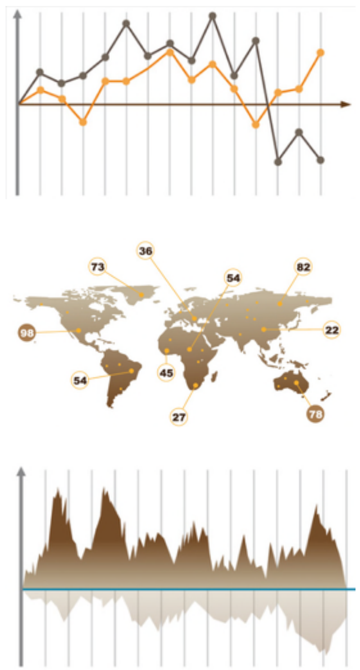
Volume
(Data size)

Velocity
(Speed of change)

Variety
(Various sources)

Veracity
(Precision)

Analysis



Analysing Big Data:

- Text analytics
- Sentiment analysis
- Face recognition
- Voice analytics
- Movement analytics
- Etc.

Value

Big data enhances price discrimination

- (Among many other things) Big data allow firms to better understand and target customers through:
  - Price discrimination
    - Same product sold at different prices to different individuals
  - Targeted marketing
    - Consumers are exposed to ads that are more likely to match their needs, tastes, …
- A priori, bad news for consumers?
  - They might have to pay a price that is closer to their "pain point" (which reduces their consumer surplus).

Big data enhances price discrimination

(…) ***the real possible evil is the growing practice of price discrimination that big data enables corporations to conduct.*** With voice-activated assistants like Siri and Cortana—and now Facebook Messenger—we receive not only the most relevant search results, but results that are profitable based on segmentation data gathered from our mobile behavior.

Sure, I'm concerned about privacy, but I'm more concerned *about paying more for a product because big data suggests that I might be a more affluent consumer****.*** **On the flip-side of the equation**, imagine that you haven't received a coupon deal because you've been deemed as unprofitable based on aggregated data gathered from your Facebook usage.

https://cllamb.wordpress.com/ (Charles Lee Lamb, April 18 2016)

Price discrimination: necessarily evil?

- Bad news ? this pessimistic view must be qualified.
  - Price discrimination allows for **market expansion**
    - E.g. because someone else paid a high(er) price you managed to obtain a low price for your seat on the plane.
  - **Competition** may have a positive effect on consumer welfare:
    - Imagine competing firms using the same information about consumers
      ➔ pure (and ferocious!) price competition for these consumers.
  - price discrimination can be prevented by **privacy** (among other things)
    - ***Exogenous privacy*** (regulation)
    - ***Endogenous privacy***: consumers' decision to hide their information
      - or … *going one step further*, **pretend** to be someone else (w/ low willingness to pay)
  - **Danger:** Differential pricing may anger and alienate customers

Monopoly and privacy

- Setting (based on Belleflamme 2015)

A monopolist can recognize some of its consumers and charge them a personalized price. To the others it charges a ‘uniform price’.

Scenario 1. No way for consumers to hide their identity.

Scenario 2. Consumers can hide their identity at some cost.

Monopoly, discrimination and privacy

The more the firm has …

- information about the consumers' willingness to pay (less privacy)
- instruments to adapt its pricing

… the more it is able to increase its profit at the consumers’ expense.

- This creates an ***endogenous demand for privacy:***

  - Consumers with high willingness to pay may want to hide:

“but I’m more concerned about paying more for a product because big data suggests that I might be a more affluent consumer.”

Monopoly, discrimination and privacy

- However … firms also know that people with high willingness to pay wish to “hide”:

  - When high value consumers can easily hide, the firm will increase its ‘uniform price’,
    - Leaving some consumers pay higher prices; and
    - Leaving others no longer being willing to purchase

  - it may be better for consumers as a group that hiding is not possible (e.g. too costly)

Discrimination and competition

- Oligopoly
  - Each firm is able to practice price discrimination.
  - The possibility to extract surplus is counterbalanced by a fiercer competition for some categories of consumers.
  - The second effect *may* outweigh the first. Consumers would then (globally) benefit from price discrimination, while firms would suffer from it.

Discrimination, competition & privacy

- Taylor and Wagman (2014) characterize winners losers from potential privacy regulation in the context of 4 duopoly models.

- **What if privacy is enforced** (i.e., no discrimination instead of perfect discrimination)?

Linear city / Circular city / Vertical diff. / Multi-unit symmetric demand

	LCM	CCM	VDM	MSDM
Total Industry Profits	higher	same	higher	lower
Consumer Surplus	lower	lower	lower	higher
Deadweight Loss	same	higher	higher	higher/lower
Consumers Prefer Privacy	none	some	some	some

Taylor, C. and L. Wagman (2014). "Customer privacy in oligopolistic mar- kets: winners, losers, and welfare". Forthcoming in the International Journal of Industrial Organization.

Discrimination, competition & privacy

- Policy recommendations

  - Studies of consumer privacy must be understood within their individual context and industries.

  - Their conclusions depend on the specific competitive landscapes at play — and may not necessarily apply more broadly.

  - Rather than a single piece of regulation to address the decline in consumer privacy, a nuanced approach that is tailored to specific markets may be more appropriate.

Taylor, C. and L. Wagman (2014). “Customer privacy in oligopolistic mar- kets: winners, losers, and welfare”. Forthcoming in the International Journal of Industrial Organization.

Behavior-based price discrimination (BBPD)

- What is BBPD?

  - When firms have information about consumers' previous purchases, they may be able to use this information to offer different prices and/or products to consumers with different purchase histories.

    - Uses "customer recognition".

    - Occurs in several markets
      - Long-distance telecommunications, mobile telephone service, magazine or newspaper subscriptions, banking services, credit cards.

  - Made easier in the digital world
    - Improvements in ICTs, spread of e-commerce and DRM systems

Behavior-based price discrimination

- Examples

Source: Conitzer, V., Taylor, C. and Wagman, L. (2010) Online Privacy and Price Discrimination, mimeo.

  - Comcast and Time Warner offer discounted packages that can be obtained only once per name and address.
  - AOL offers special “new customer” accounts that can be opened only by re-vealing credit card numbers that have not been applied before to a similar offer.
  - “Price discrimination fiasco" of 2000 in which Amazon charged past customers higher prices for DVDs that their purchase histories suggested they would want.

- Key to these examples
  - Sellers have difficulty committing to future prices and committing not to use information about past purchases.

Installation free of charge

Join Proximus and start off with a promotion!

PROMO

2 in 1 tablet/PC for €49 (~~€399.99~~)

For customers who do not yet have Internet from Proximus and who subscribe to Internet Comfort in a Pack with at least two other products. What's more, the installation is free (instead of €59)
Valid until 30/06/2016

Source: Proximus website, accessed on May 11, 2016

Behavior-based price discrimination

Source: De Nijs, R. (2013). Information provision and behaviour-based price discrimination. Forthcoming in *Information Economics and Policy.*

- The online environment enhances the possibilities for BBPD.
  - Consumer information can be easily collected.
  - It is possible to alter the price displayed on each screen.
  - It is easy to track consumer behaviour through the cross checking of cookies, IP addresses and installed software.

- Example
  - New research by the *Electronic Frontier Foundation* has found that the overwhelming majority of web browsers have unique signatures - creating identifiable "fingerprints" - that can be used to track individuals as they surf the Internet.
  - The EFF found that 84% of the configuration combinations were unique and identifiable, creating unique and identifiable browser fingerprints. Of browsers that had the Adobe Flash or Java plug-ins installed, 94% were unique and trackable.

BBPD and Commitment

- Recurrent themes: Commitment problem

  - Although having more information helps the firm extract more surplus with its current prices, consumers may anticipate this possibility, and so alter their initial purchases.

  - The seller may then be better off if it can commit to ignore information about the buyer’s past decisions. (Similar to durable-good monopoly)

BBPD and competition

- Recurrent themes: Competition effect

  - More information may lead to more intense competition between firms:

    "The economics literature on oligopoly price discrimination by purchase history is relatively new and has focused mostly on markets with symmetric firms, where the issues of market exclusion and dominance are not considered. In these situations, dynamic price discrimination by competing firms often results in intensified competition; and such pricing practices typically would not raise antitrust concerns. (Chen, 2005)"

    - Thus, even if each firm would gain by being the only one to practice BBPD, industry profits can fall when all of the firms practice it.

➔ Ambiguous welfare effects

- The welfare implications of BBPD depend on many aspects of the market structure.

BBPD and competition

- New issues
  - Information disclosure. While each firm has a dynamic incentive to adjust its prices so that it learns more about the consumers and can better segment the market, the firm also has an incentive to reduce the information that is obtained by its rivals.
  - Privacy. Consumers do have some control over allowing sellers to record their individual activities. They can exert effort to understand sellers' privacy disclosures and take actions to circumvent being tracked.
    - How? By erasing or blocking browser cookies, using a temporary email address, paying with a different credit card, making payments using a gift card acquired for cash in a brick and mortar store, and renting a postal box.
    - How does it affect the firm's pricing policy?

End of talk

Thank You!