

# A Welfare Analysis of Secondary Use of Personal Data

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## Introduction

- Increasing information sharing among firms that do not belong to the same industry
- Purposes: risk assessment, cross-marketing, identity verification
- Compatibility of secondary uses of personal data are regulated by Directive 95/46/EC
- Welfare effects of secondary uses of personal data are little understood, yet high on EU agenda
- Controversial topic!

## **Compatible Uses** - *Information Sharing*

Germany (09): Using rental histories of individuals for rental purposes

## **Incompatible Uses** - *Illegal Information Leakage*

Ireland (09): Use of insurance information for marketing of credit cards

Netherlands (00): Bankruptcy information for denial of telecom contract

## **Gray Areas:**

UK (10): Using FaceBook profiles to reject job applicants

U.S. (10): Driving Gmail user contacts unmasked into GoogleBuzz

## Main Research Questions

- 1 How is in/compatible use of personal information regulated across Europe?
- 2 Welfare impact of information sharing (focus: credit risk information)?
- 3 Welfare impact of variation of privacy regimes?

## Privacy Economics (Regulations)

- impact on firms' pricing strategies (targeting) & social welfare
- assign property rights, move threat points & induce rent-shifting

Sequential common agency

Bayesian updating of prior after acquisition of list

Conditions for existence of market for consumer lists

*Acquisti and Varian (MS 2005), Akcira and Srinivasan (MS 2005), Ben-Shoham (WP 2005), Calzolari and Pavan (JET 2006), Dodds (WP 2008), Hermalin and Katz (QME 2006), Mishra (WP 2009), Taylor (RAND 2004).*

*Merging of Credit Information* (preliminary sorting!)

## **Anonymity**

No cross-industry sale of bank data allowed (e.g. Poland)

## **Disclosure**

Cross-industry sale of data allowed qua "overriding interest"  
(e.g. Austria, Spain, UK)

## **Negotiation**

Cross-industry sale of data only with consent:

- Consent for positive/negative data (e.g. Czech Republic)
- Consent for positive data (e.g. Germany)

## Model Set-up

### Firms

- Two firms 1 and 2, monopolistic sellers
- Firm 1 sells list, if firm 2 proposes non-negative payment
- Firm 2 conducts FPD if data on consumer is available  $p_{ij}(v_i, r_j)$ .

### Consumers

- Continuum with mass 1, consumer  $n$  fully described by  $(v_i, r_j)$ .
- Valuations:  $v_i \in \{v_L, v_H\}$ ,  $0 < v_L < v_H < 1$ , payment risk  $r_j \in \{r_L, r_H\}$ ,  $0 < r_L < r_H < 1$
- Four persistent consumer types  $(v_L, r_L)$ ,  $(v_L, r_H)$ ,  $(v_H, r_L)$ ,  $(v_H, r_H)$
- Additionally,  $\alpha = \Pr\{v_i = v_H\}$  and  $\beta = \Pr\{r_j = r_H\}$  and  $LH = HL$ .
- Consumer sophistication depends on regime

## *Timing of the Game*

**Stage 1:** Each consumer observes type  $(v_i, r_j)$ . Firm 1 posts uniform offer (truthful type revelation), firm may sell list.

**Stage 2:** The next actions depend on the regulatory regime:

*Anonymity Regime:* No sale of list allowed. Firm 2 posts uniform  $\bar{p}_{ij}$ .

*Disclosure Regime:* Sale of list allowed (*no consent needed*). Firm 2: PD.

*Negotiation Regimes:* Sale of list is allowed, but only with *consent*:

- Full consent for  $(v_i, r_j)$ : positive & negative information
- Partial consent for  $v_i$ , not  $r_j$ : only for positive information.

**Stage 3:** Consumer  $\{accept; reject\}$  offer of firm 2.

## Utilities and Profits

### Consumers

A consumer's utility in case of price  $p_{ij}$  is

$$U(p_{ij}) = v_i - (1 - r_j)p_{ij}.$$

### Firms

Prices are set by firms based on available data, for example  $(v_H, r_H)$ :

$$p_{HH} = \frac{v_H}{(1 - r_H)}.$$

$$p_{HH} > p_{HL} = p_{LH} > p_{LL}$$

Profits obtained from HH-types:  $\pi_{HH} = \frac{v_H}{(1 - r_H)}(1 - r_H)\alpha\beta.$

## Results - Anonymity Regime

### Firm Profits

Parameters	$\pi_{LH}$ & $\pi_{HH}$	$\pi_{LH}$ and $\pi_{LL}$
$\beta \rightarrow 0$	$\pi_{LH} > \pi_{HH}$	Dep. on $\alpha$ , $r_L$ close to $r_H$ , $\pi_{LH} < \pi_{LL}$
$\alpha \rightarrow 0$	$\pi_{LH} > \pi_{HH}$	Dep. on $\beta$ , $r_L$ close to $r_H$ , $\pi_{LH} < \pi_{LL}$
$r_H \rightarrow 1$	$\pi_{LH} < \pi_{HH}$	$\pi_{LH} > \pi_{HH}$
$r_L \rightarrow r_H$	$\pi_{LH} < \pi_{HH}$	$\pi_{LH} > \pi_{HH}$

### Consumer Welfare

Price-setting	Who purchases?	Consumer Surplus		
		$HH$	$LH, HL$	$LL$
$p_{HH}$	$HH$	0	Do not buy	Do not buy
$p_{LH}, p_{HL}$	$LH, HL$ and $HH$	pos.	0	Do not buy
$p_{LL}$	$LL, LH, HL$ and $HH$	pos.	pos.	0

## Results - Disclosure Regime

### Firms' Profits

Depending on price setting, firm 1 generates different lists:

- (a) If  $p_{HH}$ , partial screening, i.e. only  $(v_H, r_H)$  group identified
- (b) If  $p_{LH}$ , full screening (all types identified)

It depends on pricing of firm 1, whether firm 2 can discriminate

$$\text{Price of list: } p_{HH}^{list} = \max \{ \tilde{\pi}_{HH,LH}, \tilde{\pi}_{HH,LL} \} - \overbrace{\max \{ \pi_{HH}, \pi_{LH}, \pi_{LL} \}}^{\text{Profits in Anonymity}}$$

$$\text{Price of list } p_{LH}^{list} = \tilde{\pi}^{FPD} - \max \{ \pi_{HH}, \pi_{LH}, \pi_{LL} \}$$

### Consumer Welfare

Firm 2 appropriates all PD surplus, consumer surplus shrinks in *Disclosure* (with naive consumers) compared to *Anonymity Regime*.

## Further Research - Negotiation Regimes

*Assignment of Consent over  $(v_i, r_j)$*

- Firm 1 needs to compensate discriminated types (likely to set  $p_{LH}$ )
- Compensation of  $HH, LH, HL$ , but not  $LL$  (*automatic unraveling*)
- Problematic from data protection perspective

*Assignment of Consent over  $(v_i)$*

- Same as above
- Regulations induce full unraveling & partial compensation

## Conclusions

Data protection rules have an impact on:

- firms' pricing strategies and information sharing
- distribution of rents among participants (price levels)

Net welfare effects depend on parameter values, but  $A < D, N$ .

## Future

- (1) Empirical distributions of types & numerical simulations
- (2) In *Negotiation Regimes* incentive for strategic obfuscation (*myopia*)