

A Welfare Analysis of Secondary Use of Personal Data

Nicola Jentzsch

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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	π_{LH} & π_{HH}	π_{LH} and π_{LL}
$\beta \rightarrow 0$	$\pi_{LH} > \pi_{HH}$	Dep. on α , r_L close to r_H , $\pi_{LH} < \pi_{LL}$
$\alpha \rightarrow 0$	$\pi_{LH} > \pi_{HH}$	Dep. on β , 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*)