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!
Motivation

**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 unasked into GoogleBuzz
Motivation

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

Regulation of Secondary Uses in Europe

*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)
The Model

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
The Model

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.
The Model

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:

$$\pi_{HH} = \frac{v_H}{(1 - r_H)}(1 - r_H)\alpha\beta.$$
The Model

Results - Anonymity Regime

**Firm Profits**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>$\pi_{LH}$ &amp; $\pi_{HH}$</th>
<th>$\pi_{LH}$ and $\pi_{LL}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta \to 0$</td>
<td>$\pi_{LH} &gt; \pi_{HH}$</td>
<td>Dep. on $\alpha$, $r_L$ close to $r_H$, $\pi_{LH} &lt; \pi_{LL}$</td>
</tr>
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</tr>
<tr>
<td>$r_H \to 1$</td>
<td>$\pi_{LH} &lt; \pi_{HH}$</td>
<td>$\pi_{LH} &gt; \pi_{HH}$</td>
</tr>
<tr>
<td>$r_L \to r_H$</td>
<td>$\pi_{LH} &lt; \pi_{HH}$</td>
<td>$\pi_{LH} &gt; \pi_{HH}$</td>
</tr>
</tbody>
</table>

**Consumer Welfare**

<table>
<thead>
<tr>
<th>Price-setting</th>
<th>Who purchases?</th>
<th>Consumer Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>$p_{HH}$</td>
<td>$HH$</td>
<td>0</td>
</tr>
<tr>
<td>$p_{LH}, p_{HL}$</td>
<td>$LH, HL$ and $HH$</td>
<td>$pos.$</td>
</tr>
<tr>
<td>$p_{LL}$</td>
<td>$LL, LH, HL$ and $HH$</td>
<td>$pos.$</td>
</tr>
</tbody>
</table>
The Model

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

Price of list: $p_{HH}^{list} = \max \left\{ \pi_{HH,LH}, \pi_{HH,LL} \right\} - \max \left\{ \pi_{HH}, \pi_{LH}, \pi_{LL} \right\}$

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

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

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 \(LL\) (\textit{automatic unraveling})
- Problematic from data protection perspective

Assignment of Consent over \((v_i)\)

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

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)