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2012

Online at <https://mpra.ub.uni-muenchen.de/41437/>

MPRA Paper No. 41437, posted 25 Sep 2012 13:53 UTC

# Perceived Internet privacy concerns on social network in Europe

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The development of computing technologies and Internet has made possible to capture, save and analyse increasing amount of personal information, which might impact public concern about privacy. The present article aims at analysing Internet privacy concerns in respect to social network website. We use a well-suited dataset of 23 087 individuals collected by the European Union in 2009 in all member states. Fitting an ordered logit model, we examine the variables associated with the probability to have high privacy concerns in order to draw policy and regulatory implications. The results show that institutional framework ensuring comprehensive national efforts to safeguard privacy increases the probability to be worried about possible misuse of private data. Additionally, we observe that socio-demographic variables affect the perception of individual personal data use/misuse.

**JEL:** D12, L96, K39

**Keywords:** economics of privacy; social network websites; privacy paradox

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## 1. Introduction

The increase digitalisation of information coupled with reduced costs of storing information have made possible to capture, save, and analyse increasing amounts of information and especially private data [1]. For instance, e-commerce and social network website have access to various kinds of users' personal data, leading to an increase in public concern about privacy. The collection of personal data opens a debate on the possible misuse of this data [2]. Recently, the CNIL, the French Privacy regulator and EU data authorities, have expressed their concerns about the lawfulness and fairness of the new Google's privacy policy<sup>1</sup> as this new policy might contravene European data protection legislation. On the other hand, recent empirical researches have demonstrated that the European privacy regulation has made it difficult for firms to collect and use consumers browsing data to target their advertising more accurately. Goldfarb and Tucker [3] show that the implementation of privacy regulation in Europe has reduced of 65% the influence of banner ads on individual purchase intent. This reduction is particularly pronounced for European websites offering content that is not easy to match to advertising and related to non-intrusive and smaller advertisements, while there was no change in advertising effectiveness of non-EU websites. The results suggest that privacy regulation can affect the behaviour of Internet companies by leading them to conduct more aggressive advertising campaigns.

The present article analyses the variables that affect individuals' privacy concerns about misuses of personal data on social network websites. In order to design online privacy regulation, it is important to improve the knowledge about online privacy concern. From a managerial perspective, growing consumer privacy concerns may affect industry dynamics and competitive structure.

There are two competing strands of economic literature that study privacy issues [1, 4]. On the one hand, the Chicago School emphasises the efficiency of a free market for personal data [5]. On the other hand, a critique of the Chicago School arguments shows that this approach fail to capture the complexity of consumer decision to disclose personal information [6]. In respect to this debate, it is worth to investigate how both the institutional protection and the individuals' characteristics affect individual privacy concerns. To our knowledge, there are few studies that analyze the impact of both individual characteristics and institutional

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<sup>1</sup> Google rolls out privacy policy in defiance of EU legality warnings, Financial Times, 2 March 2012.

environment on privacy concerns. Particularly, the use of Social Network Websites (SNW) (like Facebook, Twitter or MySpace) has known an extremely rapid diffusion during the last decade. In 2009, the growth of Facebook users was about 40% in Europe.<sup>2</sup> The rapid diffusion of SNW necessitates the identification of more suitable regulatory and economics privacy policy. To do so, the article analyses the influence of socio-demographics, institutional factors and ICT endowment on the individual privacy concerns in European countries. For this purpose, we use a survey conducted in all EU countries in 2009 by the EU Commission that measures different aspects of the individual behavior toward Information and Communication Technologies (ICTs). The aim of the present article is to draw policy and managerial implications upon the analysis of the variables that influence the perception of privacy concerns in the misuse of personal data in SNW.

The paper is organised as follows. Section 2 presents the review of the literature dealing with the measure of privacy concerns in different theoretical framework and details the main hypothesis tested. Section 3 shows the descriptive statistics and performs a data analysis to assess the geographical pattern of privacy concerns across the EU countries. Section 4 presents the empirical models and the results. Conclusions and discussions follow.

## **2. Literature and hypothesis**

Privacy is a multidisciplinary topic that overlaps economics, management, law, sociology and psychology domains [4]. Here, the privacy is defined as the individual's ability to control for the use of personal information. The management and economic literature have been studying about privacy since the seminal work of Warren and Brandeis [7]. Economics of privacy has important implications in different domains [8], including for example: government and regulation [2], consumer and price discriminations [9], health [10], etc. In particular, recent ICT development with the rapid diffusion of e-commerce and social network sites creates new privacy threats and so put the emphasis on the question of online privacy concerns [11-15].

In different empirical works, Westin [16, 17] identified three categories of people according to their privacy concerns: fundamentalist, pragmatist and unconcerned.<sup>3</sup> Since these seminal works, a large strand of literature has applied the Westin's framework [19-22]. However,

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<sup>2</sup> Report downloadable at: <http://www.slideshare.net/oreillymedia/facebook-demo-20090415>.

<sup>3</sup> See Kumaraguru and Cranor [18] for a literature review of the numerous privacy studies.

most of these articles analyze small sample (often only students) belonging to only one country and containing only few explanatory variables. Even if their results are not always significant from a statistical viewpoint, these studies highlight the influence of different set of variables (socio-demographics, ICTs equipment and usage, and geographic location) on individuals' online perceived privacy concerns.

In particular, the empirical literature in management and economics has investigated how socio-demographic variables - especially gender, education, age and income - affect the privacy perception of individuals. The effects of these variables on privacy concerns are not always clear. Many authors [17, 22, 23] show that males are less concerned about their online privacy in respect to women. Other studies actually do not found any significant difference between female and male in the perception of privacy [19, 21-24]. However, these empirical studies related to online perceived privacy concerns found small evidences (but not significant) of a positive effect of being a woman. Even if a positive effect for women is found, there is no explanation of this result in the economic literature. Some arguments can be found in psychology where women are considered in general as more risk-averse than men [21]. So, being a man might have a negative impact on privacy concerns. As far as age is concerned, some studies [25-27] show a positive effect of age on privacy concerns of people about Internet. Aged people seem to be more concerned by the protection of their privacy than younger people.

Education and income can also influence the perception of individual privacy. The empirical literature shows some regularity on the effect of education. In particular, O'Neil [28] and Sheehan [23] highlight a positive effect of education on online privacy concerns. However, they do not indicate potential explanations of this result. On the other hand, O'Neil [28] demonstrates the existing of a negative relationship between income level and online privacy concerns showing that high-income people - compared to low-income ones - value more the convenience of e-commerce rather than threats.

As far as cultural and geographical dimensions of privacy concerns are concerned, the empirical studies have shown some controversial hypotheses and results. On the one hand, Milberg *et al.* [2] highlight a positive effect of individualistic countries (vs. collectivist ones) on the privacy concerns of people. They argue that people living in collectivist countries have a greater acceptance of organization (government or firm) intrusion in their private life. On the other hand, Jarveenpa *et al.* [29] show evidences of the opposite effect (even if this

effect is weak) in the case of e-commerce. They show that people from former communist countries are more suspicious against the Web because they rely on inter-personal contacts and so they are more suspicious upon “distant” partners like Internet firms (e-commerce firms, social network websites, etc.); while, people from liberal or individualistic countries trust in market mechanism efficiency.

Institutional environment influences also the individual privacy concerns. Actually, Goldfarb and Tucker [3] find empirical evidences that EU Privacy Directive limited websites ability to use data on consumers' past browsing behaviour. To this aim, we include in our analysis an index measuring online and offline privacy protection in each European country. In particular, as privacy concerns occur in all aspects of modern life [8], by taking in consideration different institutional aspects, this index is a comprehensive measure of national private policy.

In the privacy paradox framework, individuals who declare to have high privacy concerns tend to expose and disclose easily their personal data [1, 30]. Despite the fact that Internet users express high privacy concerns, they provide extensive personal information on different website. On the other hand, some studies reject the privacy paradox framework and they show a negative relationship between the frequency of use of Internet (especially for e-commerce) and the perceived online privacy of people [25, 31, 32].

### **3. Descriptive statistics and data analysis**

The aim of the paper is to examine the variables associated with individual's privacy concerns, putting particular emphasis on the institutional and geographical variables. The empirical study is based upon an original dataset collected by the European Commission in the 27 countries of the European Union. Phone surveys have been carried out in December 2009 among 26 000 respondents representative of the European population<sup>4</sup>. After data cleaning, the dataset used in this study includes 23 087 observations. We rely on the above review of literature to identify the key variables that can affect privacy concerns and help to identify the policy and managerial implications.

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<sup>4</sup> Interviews have been carried out following robust sampling methods as each national sample is representative of the population aged 15 years and above. In each EU-27 country the target sample size was about 1000 respondents or more, and the national institution in charge of the survey translated the questionnaire in their respective national language(s).

To measure the institutional environment, we include also an additional variable ‘privacy index’ computed by Privacy International, an international nonprofit organization. This index assesses the extent of information disclosure, surveillance, data exploitation and the general state of information privacy. In order to test the causality effect, the index is two-year lagged. To strengthen the interpretation of the results, we present detailed descriptive statistics.

#### *Data description*

The key dependent variable MISUSE is ordinal in nature and based on the question: “To what extent are you worried or not about misuse of personal data uploaded onto social networking websites such as (use appropriate examples in each country: Facebook, MySpace, Twitter, etc.)”. The mutually exclusive responses permitted were: ‘*very worried*’, ‘*Fairly worried*’, ‘*not very worried*’, ‘*not at all worried*’. In this sample, 19.3% of the respondents declared to be very worried about the misuse of personal data while 28% were fairly worried. The largest percentage 28.7% was in the “not at all worried” group and the remaining group 24% were not very worried about the misuse of personal data.

#### [Table 1]

The demographic explanatory variables included are age, gender and education. The job conditions are measured with a set of variables: manual workers, self-employed, managers, other white collars, retired, house persons and unemployed. These variables can be also considered as a measure of individuals’ income.<sup>5</sup> We also include a dummy variable indicating if the individual is student.

In order to measure the privacy paradox, we introduce a variable measuring whether individuals are frequent users of SNW (SOCIAL NETWORK). Heavy users of SNW might be indeed more aware of possible misuse of private data. This variable is expected to have a positive influence on the privacy concerns of people. Regarding spatial dimension, we expect a significant influence of country effect on the privacy concerns of European people. However, the sign of the effect is undetermined. In order to complete the geographical analysis of

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<sup>5</sup> For this purpose, job position is a good indicator of people living condition in respect to income. Since, people income will reflect the difference in living standard among European countries rather than real living condition of people in their country.

privacy concerns, different dwelling areas within countries are taken into account. A set of mutually exclusive binary variables indicates whether the individuals live in large towns, small towns and rural areas. To our knowledge, there are not previous works on this topic that include such spatial considerations.

To measure the institutional framework, the empirical estimation exploits three sets of mutually exclusive variables. Firstly, country dummies measures the specific country institutional framework. Secondly, to measure national privacy policy we add in the regression a  $PRIVACY\ INDEX_{t-2}$  which ranges from 1 (surveillance/leading in bad practice) to 4 (comprehensive efforts, protections, and safeguards for privacy). This index - calculated by Privacy International<sup>6</sup> -provides a synthetic measure of the national institutional protection of personal information in different contexts (communication, work, health, etc.) in all European countries. The two-year lagged variable permits to instrument the national policy and to estimate the effect of privacy regulation on privacy concerns of individuals. Thus, high level of privacy index indicates comprehensive national efforts to safeguard privacy. We expect that individuals living in country where there is protection and safeguards for private data might have no privacy concern. Since, individuals can rely on protection and safeguard of personal information. Thirdly, in order to test the cultural heritage of the different European regions we introduce a set of regional dummies namely EAST, CENTRAL, SOUTH, SCANDI, ANGLO and BALTIC.

The descriptive statistics are presented in Table 1, while Annex 1 presents the correlation matrix and Annex 2 shows the breakdown statistics according to the level of individual privacy concerns.

### *Data analysis*

We investigate the similarity that exists among European countries in the perception of privacy concerns. Fig. 1 presents the breakdown statistics of individuals' privacy concern in each country, showing an important heterogeneity between countries. For instance, Luxembourger, Greek, Bulgarian or Portuguese are fairly or very worried about potential or real personal data misused. Conversely, Finnish or Hungarian mostly declare to be not really worried or not at all worried.

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<sup>6</sup> <https://www.privacyinternational.org/ephr>



[Figure 1]

We perform a cluster analysis to better identify the existence of commonalities among EU-27 countries. Fig. 2 shows the result of an Agglomerative Hierarchical Clustering (AHC) with simple linkage method. For this aim, we only use the first three categories of the variable MISUSE, i.e. the responses 'Not at all worried', 'Not very worried' and 'Fairly worried', the last category, i.e. 'Very worried', being inferred from the value of the first three categories.

[Figure 2]

The dendrogram shows the results of the cluster analysis that identifies groups according to the four ordinal responses and dissimilarity value among countries. The lower dissimilarity measure is, the more countries are similar. For instance, we see that Netherland and Austria are considered as 'similar'. Both the graphical presentation (Fig. 1) and the results of cluster analysis (Fig. 2) show that individuals living in former communist countries (Poland, Hungary, Slovenia, Estonia, etc.) and most liberal European countries (UK, Ireland, Finland, etc.) are less worried. On the other hand, Western and Southern European countries exhibit great online privacy concerns.

Thus, we can conclude that among European countries it might exist a significant difference in privacy concerns. We define this phenomenon as the 'country effect'. Milberg *et al.* [2] show that European post-communist countries (like Czech Republic, Hungary, Poland, Romania, Slovakia, Estonia, Latvia, Lithuania...) are traditionally less adverse to the privacy risk in respect to other European countries. Conversely, individualistic value countries such as central European countries seem to be more adverse to privacy concerns. Obviously, this 'country effect' is not the only determinant of privacy risk. The socio- demographic variables must also be considered to measure privacy concerns in the misuse of private data.

#### **4. Econometric models and results**

In order to study the determinants of privacy concerns, we fit an ordered logit. The estimate for this model identifies which explanatory variables push up (or down) individual privacy

concerns. In this framework, we can identify which variables are associated with a higher probability of being worried about the misuse of personal data in SNW.

The ordered logit has the following specification [33]:

$$y_i^* = x_i + u_i$$

Where  $y_i^*$  is a latent variable measuring the level of people privacy concerns,  $x_i$  is a set of explicative regressors (without an intercept), and  $u_i$  is an error term logistically distributed. Every person has its own  $y_i^*$ , which is determined by its characteristics  $x_i$  and unobserved factors  $u_i$ . They choose the category of  $y$  that represents most closely their  $y_i^*$ . So, for the 4 alternatives  $j$  ( $j=1$  to 4) we define:

$$y_i = j \text{ if } \alpha_{j-1} < y_i^* \leq \alpha_j, \quad j = 1, \dots, 4$$

Where  $\alpha_0 = -\infty$  and  $\alpha_4 = +\infty$ , so:

$$\begin{aligned} \Pr(y_i = j) &= \Pr(\alpha_{j-1} < y_i^* \leq \alpha_j) \\ &= \Pr(\alpha_{j-1} < x_i\beta + u_i \leq \alpha_j) \\ &= \Pr(\alpha_{j-1} - x_i\beta < u_i \leq \alpha_j - x_i\beta) \\ &= F(\alpha_j - x_i\beta) - F(\alpha_{j-1} - x_i\beta) \end{aligned}$$

Where  $F$  is the cumulative logistic function of  $u_i$ . The regression parameters,  $\beta$ , and the 3 threshold parameters  $\alpha_1, \alpha_2$  and  $\alpha_3$  are obtained by maximising the log likelihood with  $p_{ij} = \Pr(y_j = j)$  as defined above.

Table 2 presents the results of the ordered logit model (standard errors are corrected for heteroscedasticity). In order to show the robustness of our estimations, ANNEX 3 presents the results of different model specifications. The variables measuring the institutional environments (PRIVACY INDEX<sub>t-2</sub>, Country dummies and Regional dummies) are mutually exclusive, thus we include them in three different estimations. Model (1) measures the effect of all socio-demographic variables and the privacy index on the level of individual privacy concerns. Besides socio-demographic variables, Model (2) estimates include the regional dummies (taking as reference variable the region Central). Model (3) includes both socio-demographics variables and country fixed effects.

The results are generally consistent in the three regressions. As far as socio-demographic variables are concerned, gender (GENDER), age (AGE and AGESQ) and high education (HIGHEDU) regressors significantly influence privacy concerns. This result shows a non-linear effect of age. So, both relatively young and old people have less privacy concerns in respect to other people. From a policy perspective, it is important to inform individuals and especially young as well as old people about the possible risks associated to the private information disclosure. Additionally, the results show that women (GENDER) are more concerned about misuse of private data which corroborates the results of Westin [17] as well as Acquisti and Gross [22]. European women seem to be more suspicious than men. In line with previous study, women are more risk-adverse compared to men [21]. As far as HIGHEDU variable is concerned, being high educated has a positive influence on privacy concerns. This result corroborates the findings of Sheehan [20] and O'Neil [28]. More educated people seem to be more concerned – maybe because they are more informed about privacy threats – than less educated people.

In relation to job position variables, models (1) and (2) show that white collars (OTHERWCOLLARS) and self-employed (SELFEMPLOYED) people are more concerned by their privacy on social network websites than manual workers (MANUALWORKERS), whereas UNEMPLOYED are less worried. This result corroborates our hypothesis that job positions influence the probability to be worried about the misuse of personal data. The results show that job position impacts the level of privacy concerns. STUDENTS are likely to be worried about their privacy on social network websites. This results show that students are informed about the risks associated to the disclosure of private information.

As expected, privacy concern is positively associated with the frequent use of social network, which does corroborate the existence of privacy paradox. Since, heavy users of SNW are worried about the use of these services as declared level of individual privacy concerns differ significantly from real attitude. This result is consistent with previous works of Acquisti and Grossklags [34] and Acquisti *et al.* [35].

PRIVACY INDEX<sub>t-2</sub> variable accounts for the institutional environment of each country in time t-2, i.e. 2007. The significant and positive coefficient suggests that individuals who live in countries with higher privacy protection regulatory framework are more likely to be worried about misuse of private data. Strong privacy protection is associated with high privacy concerns for European people. This result is in line with theory that positively links the level

of privacy law enforcement to citizen's privacy concerns [26]. In this respect, the lagged variable permits to estimate the effect of regulation on privacy perception of individuals. Thus, strong law enforcement might lead to high level of privacy concerns for citizen. From a policy perspective, this result implies that high level of privacy protection is associated with awareness of the possible threats of personal data misuse. However, it should be noticed that individuals with higher privacy concerns can put pressure on the policy makers to safeguard privacy. From a managerial perspective, it suggests that companies in these countries should implement more respectful consumers' personal data management.

The coefficients of regional dummies confirm the statistical evidences. Most of the Northern European and Eastern European countries show negative and significant coefficients, which imply that individuals living in these countries are less likely to be worried. In an opposite way, Southern countries exhibit positive ones. This could reflect the legacy of collectivist culture in the Eastern European countries where individuals are less worried about the possible misuse of personal data. This has important policy implications as it implies that European regulation should also fix recommendations that take into account the heterogeneity of EU countries. These findings suggest that in European countries there are different levels of trust in SNW. This implies that firms should design their privacy strategies according to the level of privacy concerns.

As far as spatial variables are concerned (rural, small/middle or large town), they do not constitute a significant explanatory factor of perceived online privacy concerns.

[Table 2]

## **5. Discussion**

The increase digitalisation of personal information has policy and managerial implications on the use of personal data.

From a managerial perspective, users who exhibit privacy-sensitive behaviour can respond negatively to intrusive advertising. Consequently, firms can have different strategies. They can decide to stop the use of intrusive advertising techniques or they can use highly-sophisticated targeting techniques reducing the consumers' aversion [36]. Recent studies [37-41] have showed that once individuals have control on their private data, personal advertising is more effective.

The present article also permits to assess the different variables affecting the privacy awareness at individual level and at the same time, it puts particular emphasis on the institutional framework. The results suggest that individuals with less awareness of the possible private information misuse are younger and less educated people. In addition, individuals living in countries with high protection and safeguard of private data are more concerned about misuse of personal data in SNW. It implies that strong regulator framework enacts as informative campaign among individuals.

## **6. Conclusion**

The aim of the paper is to measure the privacy concerns of misuse of personal data in SNW in 27 European countries. We use a well-suited survey conducted in 2009 by the EU Commission. In a different way from most of the existing contributions, the present article studies the determinants of perceived privacy concerns on a large and representative database in order to draw policy and managerial implications. We include 3 sets of variables: individual (demographics), geographical and institutional variables. In this respect, different model specifications have been estimated to check the robustness of our results.

The results show strong influence of socio-demographic variables on the perceived privacy concerns about social network websites. Both age and gender are important determinants of perceived privacy concerns. Young and old people appear less concerned by their privacy on SNW in respect to other age classes. As far as old people are concerned, one possible explanation can be related to the lack of knowledge about social network websites. On the other hand, young people – that are supposed to be heavy users of SNW – are less informed about the risks associated with private data disclosure. This could reflect insufficient awareness about risks associated with personal data misuse on SNW. We also observe a positive influence of high level of education. This result is probably due to better information of educated people about the potential threats on their privacy on social network websites.

The econometric analysis shows significant effects of both institutional and geographic variables on the perceived privacy concerns about data misuse on social network websites. Significant protections of private data can increase the privacy concerns of individuals. From a regulatory perspective, this result suggests that individuals are aware of the possible threats of personal data disclosure. This result has also managerial implications, as it implies

that companies in these countries should implement more respectful safeguard of personal data. However, it should be underlined that heavy users of SNW are likely to be worried about the misuse of personal data. This result corroborates the privacy paradox hypothesis. The microeconomics analysis of privacy shows that consumers do not act rationally when facing privacy trade-offs.

From institutional perspective, we observe that most people of Northern and Eastern European countries are less concerned by a potential misuse of personal data on social network websites. Conversely, people from most of Central and Southern Europe appear to be more worried about their online privacy. These results can reflect the institutional legacy of former collectivist countries (government control of individuals). On the other hand, Northern countries trust more the market mechanisms, which might punish intrusive business model.

The study has important policy implications as it can give the instruments to identify how to assess individual concerns about private data. Particular attention should be addressed to young and old people as well as low educated individuals as they need more information on possible private disclosure threats. Further empirical analyses are needed to test in depth the differences among the European countries and in particular it would be interesting to have panel data to estimate the effect of the different privacy policy in each European country.

## **Bibliography**

[1] Acquisti, A., The economics of Personal data and the economics privacy, OECD Working Papers (2010) WPISP and WPIE, <http://www.oecd.org/dataoecd/8/51/46968784.pdf>.

[2] Milberg, S.J., Smith, H.J., Burke, S.J., Information privacy: corporate management and national regulation, *Organization Science*, 11 (2000) 35-57.

[3] Goldfarb, A., Tucker, C., Privacy regulation and online advertising, *Management Science* 57 (2011) 57-71.

[4] Hui, K.-L., Png, I.P., The economics of privacy, in: T. Hendershott, (Ed.), *Handbook in Information System*, Elsevier, 2006.

[5] Stigler, G.J., An introduction to privacy in economics and politics, *Journal of Legal Studies* 9 (1980) 623-644.

- [6] Hirschleifer, J., Privacy: its origin function, and future, *Journal of Legal Studies* 9 (1980) 649 664.
- [7] Warren, S., Brandeis, L.D., *The Right to Privacy*, *Harvard Law Review*, 193 (1890).
- [8] Lessig, L., *Code: and other laws of Cyberspace*. Basic Books, New York, (1999).
- [9] Varian, H.R., Price discrimination and social welfare, *American Economic Review* 75 (1985) 870–875.
- [10] Heikkila, E.J., An information perspective on path dependence, *Journal of Institutional Economics* 7 (2011), 23 45.
- [11] Koyuncu, C., Lien, D. (2003) E-commerce and consumer's purchasing behavior, *Applied economics* 35 (2003) 721 726.
- [12] Johnson, E.J., Moe, W., Bellman, S., Lohse, J., Fader, P. On the Depth and Dynamics of Online Search Behavior, *Management Science* 50 (2004) 299 308.
- [13] Montgomery, A.L., Li, S., Srinivasan, K., Liechty, J.C, Modeling online browsing and path analysis using clickstream data, *Marketing Science* 23 (2004) 579 595.
- [14] Arora, N., Drèze, X., Ghose, A., Hess, J. D., Iyengar, R., Jing, B., Joshi, Y., Kumar, V., Lurie, N., Neslin, S., Sajeesh, S., Su, M., Syam, N., Thomas, J. and Zhang, Z. J., Putting One-to-One Marketing to Work: Personalization, Customization and Choice, *Marketing Letters*, 19 (2008) 305 321.
- [15] Palm, E., Hansson S. O., The case for ethical technology assessment (eTA), *Technological Forecasting and Social Change* 73 (2006) 543 558.
- [16] Westin, A.F., *Privacy and Freedom*. Atheneum Publishers, New York, 1967.
- [17] Westin, A., *Consumer, Privacy and Survey Research*, 2003. [http://www.harrisinteractive.com/advantages/pubs/DNC\\_AlanWestinConsumersPrivacyandSurveyResearch.pdf](http://www.harrisinteractive.com/advantages/pubs/DNC_AlanWestinConsumersPrivacyandSurveyResearch.pdf).
- [18] Kumaraguru, P., Cranor, L.F. Privacy indexes: a survey of Westin's studies. Institute for Software Research International, School of Computer Science, Carnegie Mellon University, Pittsburgh, PA, Technical Report CMU-ISRI-5-13, 2005, <http://reports-archive.adm.cs.cmu.edu/anon/isri2005/CMU-ISRI-05-138.pdf>.
- [19] Ackerman, M.S., Cranor, L.F., Reagle, J. Privacy in E-Commerce: Examining User Scenarios and Privacy Preferences, in: *Proceedings of the ACM Conference on Electronic Commerce EC'99*, November 3-5, Denver, USA, 1999.
- [20] Sheehan, K.B., Toward a typology of Internet users and online privacy concerns, *The Information Society* 18 (2002) 21 32.
- [21] Jensen, C., Potts, C., Jensen, C., Privacy practices of Internet users: self-reports versus observed behaviour, *International Journal Human-Computer Studies* 63 (2005) 203 227.

- [22] Acquisti, A., Gross, R. Imagined communities: Awareness, information sharing, and privacy on the Facebook, in: P. Golle and G. Danezis (Eds.), Proceedings of 6th Workshop on Privacy Enhancing Technologies, Robinson College, Cambridge, UK, 2006.
- [23] Sheehan, K.B., An investigation of gender differences in on-line privacy concerns and resultant behaviors, *Journal of Interactive Marketing* 13 (1999) 24 38.
- [24] Yao, M.Z., Rice, R.E., Wallis, K., Predicting user concerns about online privacy. *Journal of the American Society for Information Science and Technology*, 58 (2007) 710 722.
- [25] Phelps, J.E., Nowak, G.J., Ferrel, E., Privacy concerns and consumer willingness to provide personal information, *Journal of Public Policy & Marketing* 19 (2006) 27 41.
- [26] Bellman, S., Johnson, E.J., Kobrin, S.J., Lohse G.L. International differences in information privacy concerns: a global survey of consumers, *The Information Society* 20 (2004) 313 324.
- [27] Brown, I., Zukowski, T., Examining the influence of demographic factors on Internet users' information privacy concerns, in: Proceedings of the 2007 annual research conference of the South African institute of computer scientists and information technologists on IT research in developing countries, Port Elizabeth, South Africa, 2007.
- [28] O'Neil, D., Analysis of Internet users' level of online privacy concerns, *Social Science Computer Review*, 19 (2001) 17 31.
- [29] Jarvenpaa, S.L., Tractinsky, N., Saarinen, L., Consumer trust in an Internet store: a Cross-Cultural Validation, *Journal of Computer-Mediated Communication* 5 (1999).
- [30] Norberg, P.A., Horne D.R., Horne, D.A, The privacy paradox: personal information disclosure intentions versus behaviors, *Journal of Consumer Affairs* 41 (2007) 100 126.
- [31] UCLA Center for Communication Policy, The UCLA Internet report: Surveying the digital future: 4<sup>th</sup> Year, 2004. <http://www.digitalcenter.org/downloads/DigitalFutureReport-Year4-2004.pdf>.
- [32] Metzger, M., Privacy, trust, and disclosure: Exploring barriers to electronic commerce. *Journal of Computer-Mediated Communication*, 9 (2004).
- [33] Cameron, A.C., Trivedi, P.K., *Microeconomics using Stata*. Stata Press, College Station, 2010.
- [34] Acquisti, A., J. Grossklags (2007). What can behavioral economics teach us about privacy?, in: S. G. C. L. Alessandro Acquisti, Sabrina De Capitani di Vimercati (Eds.), *Digital Privacy: Theory, Technologies and Practices*, Taylor and Francis Group, Auerbach Publications.
- [35] Acquisti, A., L. John, G. Loewenstein, What is privacy worth? In *Workshop on Information Systems Economics*, 2009.
- [36] Tucker, C. The economics of advertising and privacy, *International journal of Industrial organization*, forthcoming (2012).



- [37] Culnan, M., Armstrong, P., Information privacy concerns, procedural fairness, and interpersonal trust: an empirical investigation, *Organization Science* (1999) 104 115.
- [38] Malhotra, N.K., Sung, S.S., Agarwal, J., Internet users' information privacy concerns (IUIPC): The construct, the scale, and a causal model, *Information Systems Research* (2004) 336 355.
- [39] Tucker, C., *Social Networks, Personalized Advertising, and Privacy Controls*. Mimeo, MIT, 2011.
- [40] Chen P.T., Hsieh H. P., Personalized mobile advertising: Its key attributes, trends, and social impact, *Technological Forecasting & Social Change* 79 (2012) 543 557.
- [41] Rochelandet, F, *Economie des données personnelles et de la vie privée*, La Découverte, Paris, 2010.

**Table 1. Descriptive statistics**

Variables and descriptions		Expected sign	Mean	Std. Dev.	Min	Max	Nb. of obs.
<b>Endogenous variable</b>							
MISUSE			2.38	1.09	1	4	23 087
<b>Socio-demographic variables</b>							
AGE	Indicates the age of the individuals	Positive	46.2	17.9	15	98	23 087
AGESQ	Indicates the square of the age of the individuals	Uncertain	2446.5	1733.8	225	9 604	23 087
GENDER	Equal to 1 if individual is male and 0 otherwise	Negative	0.467	0.499	0	1	23 087
HIGHEDU	Equal to 1 if individual has high education <sup>1</sup> , 0 otherwise	Positive	0.289	0.453	0	1	22 696
<b>Job positions</b>							
MANUALWORKERS	<i>Equal to 1 if individual is a manual worker, 0 otherwise</i>	<i>Ref.</i>	<i>0.203</i>	<i>0.402</i>	<i>0</i>	<i>1</i>	<i>23 087</i>
SELFEMPLOYED	Equal to 1 if individual is self employed, 0 otherwise	Uncertain	0.079	0.270	0	1	23 087
MANAGERS	Equal to 1 if individual is a manager, 0 otherwise	Positive	0.098	0.298	0	1	23 087
OTHERWCOLLARS	Equal to 1 if individual is a white collar (except manager), 0 otherwise	Positive	0.123	0.328	0	1	23 087
RETIRED	Equal to 1 if individual is retired, 0 otherwise	Negative	0.256	0.437	0	1	23 087
HOUSEPERSON	Equal to 1 if individual stays at home, 0 otherwise	Uncertain	0.075	0.264	0	1	23 087
UNEMPLOYED	Equal to 1 if individual is unemployed, 0 otherwise	Negative	0.077	0.267	0	1	23 087
STUDENT	Equal to 1 if individual is student, 0 otherwise	Negative	0.088	0.284	0	1	23 087
<b>Geographic variables</b>							
BIGTOWN	<i>Equal to 1 if individual lives in a big town, 0 otherwise</i>	<i>Ref.</i>	<i>0.287</i>	<i>0.452</i>	<i>0</i>	<i>1</i>	<i>23 087</i>
SMALLTOWN	Equal to 1 if individual lives in a small or middle sized town, 0 otherwise	Negative	0.358	0.480	0	1	23 087
RURAL	Equal to 1 if individual lives in a rural area, 0 otherwise	Uncertain	0.354	0.478	0	1	23 087
<b>Institutional variables</b>							
PRIVACY INDEX <sub>t-2</sub>	Index measuring the level of privacy protection in 2007 (country level variable)	Positive	2.401	0.411	1.4	3.1	23 087
COUNTRY DUMMIES	Country dummies for the 27 countries (see Section III)	Uncertain					23 087
<b>Social network intensity of use</b>							
SOCIAL NETWORK	Frequency use of social network website	Negative	2.316	1.903	1	6	23 087
<b>Regional dummies</b>							
CENTRAL	<i>Equal to 1 if the country is located in central Europe (Belgium, France, Luxembourg, Holland, Austria, Germany), 0 otherwise</i>	<i>Ref.</i>	<i>0.234</i>	<i>0.423</i>	<i>0</i>	<i>1</i>	<i>23 087</i>
EAST	Equal to 1 if the country is located in Eastern Europe (Bulgaria, Czech Rep., Hungary, Poland, Romania, Slovak Rep., Slovenia), 0 otherwise	Negative	0.254	0.435	0	1	23 087
SOUTH	Equal to 1 if the country is located in Southern Europe (Greece, Spain, Italy, Portugal, Cyprus, Malta), 0 otherwise	Positive	0.193	0.395	0	1	23 087
SCANDI	Equal to 1 if the country is located in Northern Europe (Denmark, Finland, Sweden), 0 otherwise	Negative	0.119	0.324	0	1	23 087
ANGLO	Equal to 1 if the country is located North-West Europe (Ireland, Great Britain, Northern Ireland), 0 otherwise	Negative	0.091	0.288	0	1	23 087
BALTIC	Equal to 1 if the country is located in North-East Europe (Estonia, Latvia, Lithuania), 0 otherwise	Uncertain	0.107	0.310	0	1	23 087

Reference variables in italics

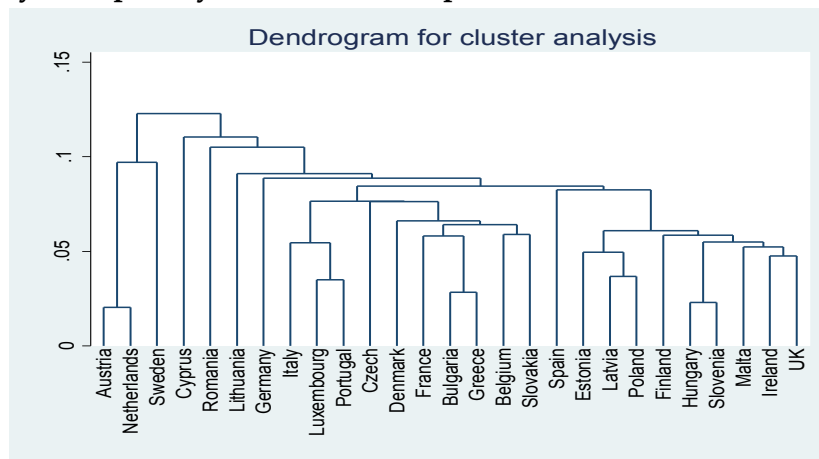
<sup>1</sup> It indicates people who have more than a high school diploma.

Figure 1. Percentage of fairly worried or very worried individuals about the misuse of personal data



Source: Eurobarometer survey 2009

Figure 2. A cluster analysis of privacy concerns in European countries



**TABLE 2: Results of ordered logit regression**

	Model (1)		Model (2)		Model (3)	
AGE	0.0565***	(11.74)	0.0614***	(12.64)	0.0647***	(13.27)
AGESQ	-0.001***	(-12.96)	-0.001***	(-13.75)	-0.001***	(-14.22)
GENDER	-0.143***	(-5.73)	-0.153***	(-6.12)	-0.157***	(-6.26)
HIGHEDU	0.136***	(4.74)	0.201***	(6.79)	0.195***	(6.42)
MANUALWORKER	Ref.		Ref.		Ref.	
SELFEMPLOYED	0.115**	(2.29)	0.0883*	(1.74)	0.0590	(1.16)
MANAGERS	0.0936**	(2.08)	0.0950**	(2.10)	0.0867*	(1.90)
OTHERWCOLLARS	0.124***	(3.07)	0.0997**	(2.44)	0.0854**	(2.06)
HOUSEPERSON	0.139***	(2.62)	0.0661	(1.22)	0.102*	(1.86)
UNEMPLOYED	-0.171***	(-3.32)	-0.127**	(-2.46)	-0.148***	(-2.84)
RETIRED	-0.108**	(-1.98)	-0.0889	(-1.63)	-0.0914*	(-1.68)
STUDENT	0.160***	(3.05)	0.221***	(4.16)	0.229***	(4.25)
BIGTOWN	Ref.		Ref.		Ref.	
SMALL TOWN	0.0500*	(1.69)	0.0343	(1.15)	0.0406	(1.31)
RURAL	0.0179	(0.59)	-0.0159	(-0.52)	0.0383	(1.23)
FACEBOOK	0.00828	(1.19)	0.0224***	(3.15)	0.0439***	(6.01)
INDEX	0.158***	(5.19)				
CENTRAL	Ref.		Ref.			
EAST			-0.343***	(-9.94)		
SOUTH			0.0284	(0.75)		
SCANDI			-0.612***	(-15.08)		
ANGLO			-0.323***	(-6.62)		
BALTIC			-0.669***	(-15.42)		
COUNTRY DUMMIES					Yes	
CUT1_CONS	0.455***	(3.28)	-0.0441	(-0.36)	-0.0867	(-0.57)
CUT2_CONS	1.510***	(10.84)	1.025***	(8.40)	1.005***	(6.64)
CUT3_CONS	2.855***	(20.37)	2.386***	(19.41)	2.391***	(15.74)
N	22664		22664		22664	
PSEUDO R-SQ	0.013		0.019		0.029	

Robust standard error in parenthesis. Level of significance \* p<.10, \*\*p<.05, \*\*\* p<.01

## Annexe 1. Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Misuse	1																				
Age	-.096	1																			
Agesq	-.118	.982	1																		
Gender	-.046	.004	.007	1																	
Highedu	.053	.012	-.020	.020	1																
Selfemployed	.034	-.018	-.047	.097	.066	1															
Managers	.048	-.063	-.097	.031	.321	-.098	1														
Otherwcollars	.055	-.128	-.155	-.045	.084	-.110	-.124	1													
Houseperson	.036	-.012	-.026	-.241	-.078	-.084	-.095	-.107	1												
Unemployed	-.018	-.122	-.133	.011	-.044	-.085	-.096	-.108	-.082	1											
Retired	-.123	.695	.740	.022	-.072	-.172	-.193	-.218	-.166	-.168	1										
Student	-.005	-.463	-.368	.021	-.201	-.093	-.104	-.118	-.090	-.091	-.184	1									
Smalltown	.008	.012	.013	-.008	.018	-.027	.002	.001	-.018	-.013	.022	.004	1								
Rural	-.010	.046	.041	.011	-.087	.051	-.043	-.062	.035	.010	.021	-.049	-.554	1							
Facebook	.041	-.521	-.481	-.001	.061	-.013	.066	.066	-.055	.025	-.325	.367	.023	-.099	1						
Privacy index	.039	-.018	-.022	.000	-.080	.060	-.054	.024	.047	-.031	-.019	.011	-.027	-.006	-.066	1					
East	-.027	-.019	-.024	-.025	-.074	.009	-.027	.042	-.085	-.009	.045	.010	-.037	.002	-.040	.121	1				
South	.070	-.034	-.031	-.001	-.110	.060	-.074	.014	.140	-.019	-.069	.010	-.023	.008	-.044	.327	-.284	1			
Scandi	-.068	.093	.091	.034	.235	-.017	.063	-.009	-.091	-.044	.053	-.006	.063	-.038	.042	-.189	-.215	-.180	1		
Anglo	-.017	-.003	.004	-.008	-.056	-.013	.007	-.029	.075	.017	-.015	-.028	-.054	-.011	.010	-.408	-.185	-.155	-.117	1	
Baltic	-.069	-.090	-.087	-.006	.022	-.030	.030	-.036	-.014	.101	-.061	.058	.010	-.040	.116	-.061	-.203	-.169	-.128	-.111	1

## Annexe 2. Breakdown statistics

Variable	Whole sample (%)	Not at all worried (%)	Not very worried (%)	Fairly worried (%)	Very worried (%)
<b>Age:</b> - 15 to 25 years old	15.3	12.7	21.2	15.4	11.5
- 26 to 35 y.o.	17.0	12.4	20.5	19.0	16.4
- 36 to 45 y.o.	18.2	12.8	19.5	21.0	20.5
- 46 to 55 y.o.	16.7	15.5	14.5	17.9	19.2
- 55 to 65 y.o.	16.0	19.1	12.9	14.3	17.6
- More than 65 y.o.	17.0	27.6	11.4	12.3	14.8
<b>Gender:</b> - Female	53.3	51.0	50.9	55.5	56.3
- Male	46.7	49.0	49.1	44.5	43.7
<b>Education:</b> <sup>2</sup> - Low	71.1	76.3	68.8	68.7	69.9
- High	28.9	23.7	31.2	31.3	30.1
<b>Job position:</b> - Retired	7.9	6.8	7.2	8.9	9.1
- Selfemployed	9.8	6.6	11.6	11.2	10.5
- Managers	12.3	8.5	13.6	14.7	12.7
- Otherwhites	20.3	18.1	21.5	21.3	20.4
- <i>Manualworks</i>	7.5	6.6	6.7	8.0	9.3
- House	7.7	8.5	7.8	6.9	7.5
- Unemployed	25.6	38.5	18.4	19.6	24.2
- Student	8.8	6.5	13.1	9.4	6.3
<b>Location:</b> - <i>Bigtown</i>	28.7	27.9	30.1	28.5	28.5
- <i>Smalltown</i>	35.8	34.8	36.1	36.9	35.5
- <i>Rural</i>	35.4	37.3	33.8	34.6	36.0
<b>Regional Dummies:</b>					
- <i>East</i>	25.4	27.8	24.2	24.3	25.2
- <i>Central</i>	23.4	17.4	25.8	25.4	26.4
- <i>South</i>	19.3	17.4	15.5	21.3	24.2
- <i>Scandi</i>	11.9	13.4	14.8	11.1	7.4
- <i>Anglo</i>	9.1	10.5	8.6	8.0	9.6
- <i>Baltic</i>	10.7	13.5	11.1	10.0	7.3
<b>Total (%/nb.of obs.)</b>	<b>(100%/23 087)</b>	<b>(28.7%/6 632)</b>	<b>(24.0%/5 537)</b>	<b>(28.0%/6 468)</b>	<b>(19.3%/4 450)</b>

Source: Eurobarometer Survey 2009

In italics reference variables of mutual exclusive dummies

<sup>2</sup> For this variable, we only have 22 696 observations.

### Annex 3. Results of ordered logit models

	Model (4)		Model (5)		Model (6)		Model (7)		Model (8)		Model (9)	
Age					0.0564***	(14.94)	0.0572***	(15.06)	0.0596***	(15.56)		
Agesq					-0.001***	(-17.67)	-0.001***	(-17.74)	-0.001***	(-18.03)		
Gender					-0.158***	(-6.58)	-0.159***	(-6.61)	-0.167***	(-6.93)		
Highedu					0.148***	(5.56)	0.209***	(7.64)	0.197***	(7.01)		
Manualworker	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Selfemployed	0.126**	(2.57)	0.117**	(2.38)							0.0915*	(1.86)
Managers	0.178***	(4.21)	0.210***	(4.93)							0.203***	(4.74)
Otherwcollars	0.163***	(4.12)	0.150***	(3.77)							0.135***	(3.34)
Houseperson	0.147***	(2.87)	0.0963*	(1.85)							0.131**	(2.49)
Unemployed	-0.192***	(-3.76)	-0.150***	(-2.94)							-0.171***	(-3.33)
Retired	-0.503***	(-12.83)	-0.487***	(-12.47)							-0.482***	(-12.31)
Student	-0.133***	(-3.14)	-0.125***	(-2.92)							-0.145***	(-3.35)
BigCity	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Small Town	0.0488*	(1.67)	0.0273	(0.92)					0.0333	(1.08)	0.0290	(0.95)
Rural	0.00484	(0.16)	-0.0362	(-1.20)					0.0302	(0.97)	0.0133	(0.43)
Facebook	0.0123*	(1.91)	0.0248***	(3.79)	0.0122*	(1.77)	0.0280***	(3.97)	0.0480***	(6.60)	0.0433***	(6.45)
Index	0.166***	(5.53)			0.168***	(5.56)						
Central	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
East			-0.309***	(-9.11)			-0.345***	(-10.07)				
South			-0.0116	(-0.31)			0.0366	(0.98)				
Scandi			-0.560***	(-14.15)			-0.600***	(-14.91)				
Anglo			-0.377***	(-7.79)			-0.331***	(-6.86)				
Baltic			-0.648***	(-15.16)			-0.682***	(-15.82)				
Country dummies									Yes		Yes	
cut1_cons	-0.563***	(-6.83)	-1.210***	(-27.40)	0.368***	(3.16)	-0.223**	(-2.38)	-0.220*	(-1.95)	-1.291***	(-17.42)
cut2_cons	0.477***	(5.80)	-0.158***	(-3.63)	1.420***	(12.14)	0.845***	(9.00)	0.870***	(7.70)	-0.217***	(-2.96)
cut3_cons	1.813***	(21.82)	1.190***	(26.77)	2.763***	(23.42)	2.204***	(23.22)	2.254***	(19.82)	1.157***	(15.67)
N	23087		23087		22696		22696		22664		23087	
pseudo R-sq	0.008		0.014		0.012		0.019		0.028		0.023	

Robust standard error. Level of significance \* p<.10, \*\*p<.05, \*\*\* p<.01