European Economic Review 75 (2015) 43–59

Contents lists available at ScienceDirect

European Economic Review

journal homepage: www.elsevier.com/locate/eer

Privacy concerns, voluntary disclosure of information, and unraveling: An experiment

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ARTICLE INFO

Article history:
Received 22 July 2014
Accepted 10 January 2015
Available online 21 January 2015

JEL classification:
C72
C90
C91

Keywords:
Information revelation
Level-*k* reasoning
Privacy

ABSTRACT

We study the voluntary revelation of private information in a labor-market experiment where workers can reveal their productivity at a cost. While rational revelation improves a worker's payoff, it imposes a negative externality on others and may trigger further revelation. Such unraveling can be observed frequently in our data although less often than predicted. Equilibrium play is more likely when subjects are predicted to conceal their productivity than when they should reveal. This tendency of under-revelation, especially of low-productivity workers, is consistent with the level-*k* model. A loaded frame where the private information concerns the workers' health status leads to less revelation than a neutral frame.

1. Introduction

Privacy concerns and the treatment of personal data are at the center of current policy debates.[1] With the rise of digital data processing and the increased communication of information via the Internet, a wealth of personal data can be easily accumulated and distributed. As a result, enterprises and governmental institutions alike face new challenges of how to adequately handle the private data of their citizens and clients.

Situations where subjects *voluntarily* disclose private information are regarded as increasingly important. For example, prospective tenants or job applicants often voluntarily disclose verified personal information. Online services such as MyBackgroundCheck.com provide verified information on drug tests, criminal records and previous rental addresses to prospective landladies or employers.[2] New-generation passports and identity cards may contain biometric data; often these

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[1] To quantify this statement, we conducted a Google Books Ngram Viewer comparison of several keywords and compared them to the term "privacy concerns". We found that the use of the term "privacy concerns" in the English literature has been increasing steadily since the 1970s. This is in contrast to other topics like "nuclear threat" (in decline and nowadays occurring less frequently than "privacy concerns") or "racial discrimination" (more frequent than "privacy concerns", but also in decline).

[2] Connolly (2008) explicitly advises applicants in the job market to use such online services (pp. 59-60).

http://dx.doi.org/10.1016/j.euroecorev.2015.01.005
0014-2921/

are optional. Finally, health or pregnancy tests are often voluntarily provided to existing or future employers.[3] A large part of the privacy debate regards it as highly relevant whether the revelation of sensitive information is voluntary.[4]

But even when the disclosure of personal information is voluntary, privacy issues can arise due to unraveling effects. Unraveling is a signaling process which works as follows: in a world where credible signals can easily be obtained and distributed, these signals will be used by those with the best medical records, credit scores, etc. This can force others to disclose similar information about themselves because not disclosing will be interpreted as a signal of low quality. In other words, unraveling is the result of signaling where revelation of high quality leads to expectations of low quality for those who do not disclose and, in turn, to more revelation. Thus, granting people the right to decide whether to disclose can be less of a voluntary choice than it seems at first sight. Or, as Posner (1998, p. 103) succinctly puts it "*As for privacy in general, it is difficult to see how a pooling equilibrium is avoided in which privacy is 'voluntarily' surrendered, making the legal protection of privacy futile*."

The importance of the unraveling argument is also reflected in the legal debate. Peppet (2011) summarizes the legal perspective and argues that the voluntary disclosure of private information is crucial because of unraveling effects. The challenge to regulating voluntary disclosure is that there are always some agents in whose interest it is to disclose their information. Limits to inquiry that forbid an uninformed party from seeking information from an informed counterpart may not be sufficient as the informed party might feel that it is in her interest to disclose the information. A means to avoid unraveling may be to completely forbid the use of certain information, as for example in the 2008 US *Genetic Information Nondiscrimination Act* (GINA) which prohibits the use of genetic information by insurers.

We study the voluntary disclosure of information in a laboratory experiment with the help of a revelation game. In a labor market, workers can truthfully reveal their productivity at a positive cost. Costly and truthful revelation can be seen as a way to overcome the lemons problem (Akerlof, 1970). Rational revelation imposes an externality on others because it lowers the wage paid to other workers. Complete unraveling occurs when all workers reveal—except for the one with the lowest productivity who is identified by the fact that she does not reveal her productivity.

Our research questions are to what extent subjects reveal their productivity in an experiment, and whether these choices are in line with the equilibrium predictions. We further investigate how revelation choices depend on the productivity of the worker, the characteristics of the market, and the contextual framing of the choice.

We consider markets where revelation comes at a positive cost. Such costs may consist of the time and effort of the player involved or the payments to (legal, medical, etc.) specialists who conduct the certification. This does not only appear realistic in some cases, it also allows for a richer outcome space: not all players reveal their productivity in equilibrium. With zero revelation costs, revealing is always rational and there cannot be any mistaken revelation decisions. In contrast, if the costs of revelation are strictly positive, the share of workers who reveal depends on the revelation cost and the distribution of productivities. Depending on these parameters, there may be equilibria with complete unraveling, with partial unraveling, or with no revelation at all.

We implement three different experimental markets where either a high, a medium or a low degree of unraveling should occur according to the theory. We focus on the revelation decisions of the workers: employers are not represented by laboratory participants, so all results are driven by the behavior of the workers. Including employers in our experiments would come at the expense of adding another potential confound of unraveling (for example, social preferences between the worker and the employers).

Our results are as follows. The equilibrium predictions for the three markets capture the differences in observed aggregate revelation rates across these markets well. We observe a significant amount of unraveling. At the same time, we find that revelation rates are somewhat lower than in equilibrium in two of the three markets. Workers who are supposed to reveal their productivity in equilibrium fail to take the equilibrium choice significantly more often than workers who should conceal. We will argue that this pattern is consistent with behavioral models such as the level-k model of bounded rationality (see the literature survey below). We also find a statistically and economically significant framing effect: there is less revelation in the contextualized sessions. Thus, it appears that our labor-market frame where workers can provide employers with a health certificate triggers privacy concerns.

Taken together, our results confirm the concerns about voluntary revelation raised in the privacy debate. We observe robust revelation rates, suggesting this behavior is likely to occur in voluntary disclosure regimes in the field where incentives for revelation may be even stronger (see our Conclusion). Thus, unraveling effects should be considered in the context of privacy policies.

In the next section, we review the relevant literature. Section 3 introduces the revelation game and Section 4 the experimental implementation and the different treatments. Section 5 reports on the results. Section 6 investigates reasons for the behavioral patterns we observe and Section 7 concludes.

[3] Some of Apple Inc. suppliers screened their workers with health and pregnancy test (Apple Inc, 2012). See also New-York Times, January 26, 2012. Further examples, discussed in Peppet (2011), include car insurance policies or rental car contracts where drivers can voluntarily agree to have the car monitored with GPS-based systems.

[4] See Curtis (2006) for the debate in Australia, Acharya and Kasprzycki (2010) for Canada, Probst (2011) for Germany, Grijpink (2001) for The Netherlands.