DISCUSSION PAPER

The Willingness to Sell Personal Data

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Abstract

We elicit the willingness to sell personal data (contact information, Facebook details, preferences) in laboratory experiments, using a BDM and take-it-or-leave-it offers. Our experiments are novel in that (i) the experiments are incentivized, (ii) the focus on privacy issues is salient, and (iii) the use of the data—marketing purposes—is transparent and unambiguous. We find that only a minority of about 10% to 20% of the participants are unwilling to sell personal data, a share which is roughly constant across both the type of personal data and elicitation method. Subjects willing to sell request about € 15 for their contact details and € 19 for Facebook details.

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1 Introduction

How people evaluate the uses of their personal data—indeed, whether they consent to the uses of such data by others at all—is important for the public policy of privacy. Currently, enterprises, governments, and scientific research institutions are investing into large, detailed data sets compiled from different sources ("Big Data"), often including individual-level personal data. At the same time, there is a growing degree of concern and unease in the population about the commercial uses of private data. An uninformed regulatory policy regarding privacy issues can cause significant welfare losses, so how people value their privacy is central.

Existing empirical studies eliciting such evaluations of privacy protection, however, suggest highly diverse results. On the one hand, some survey studies[1] suggest that a vast majority of the population are highly concerned about their personal data, with up to 90% of the participants categorically denying any willingness to sell personal data for commercial use. Moreover, those participants who do agree in exchange for compensation make rather high demands (Acquisti and Grossklags, 2005) which are far removed from the real value or market price of such data.[2] On the other hand, some incentivized field studies indicate that very few participants are willing to pay even petty sums of money in exchange for better privacy protection (Beresford, Kübler, and Preibusch, 2012). The enormous discrepancies in the willingness to pay for privacy reported in these studies arguably limit their usefulness for policy making.

Various explanations have been proposed to explain the variance in the results of the empirical studies. Here, we discuss the most significant issues (see also Tsai, Egelman, Cranor, and Acquisti, 2011).

First, many of the empirical studies on the valuation of privacy employ hypothetical methods like contingent valuation surveys and non-incentivized experiments. It is well known that the willingness to pay can be substantially lower in incentivized settings. Harrison and Rutström (2008) suggest a *hypothetical bias* which occurs when values that are elicited in a hypothetical context, such as a survey, differ from those elicited in an incentivized context, such as a market or auction. They review a number of studies (mainly about the evaluation of environmental goods) and find that contingent valuation surveys systematically yield higher values than those obtained in a non-hypothetical setting with monetary incentives.

Second, the questions posed about privacy often do not make clear (deliberately or

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[1] See Office of the Australian Information Commissioner (2013) for Australia, Phoenix SPI (2013) for Canada, or Rainie, Kiesler, Kang, and Madden (2013) for the US. In section 4 of this study, we report in detail on a recent study for Germany.

[2] Prices for contact data at professional data brokers hardly exceed € 0.50 per data set. For instance, at `http://shop.schober.com` address data from Germany is available at a price of € 0.24 per data set and the selection may be conditioned on several aspect (age, housing, etc.). The corresponding telephone numbers can be purchased at the same site for an additional fee of € 0.13. Similar services also exist in the US. For instance, at `http://www.geoselector.com` 10,000 addresses from Californian consumers were offered for $399.90.

not) who will use the participant's personal data and for what purpose. While this may be realistic in some situations people face in every day life and may thus be relevant for policy, it is important to note that decision makers dislike such ambiguity, and the willingness to sell personal data in such cases is reduced. Acquisti and Grossklags (2005) emphasize the relevance of ambiguity. They report a generally low willingness to sell information (with a large proportion "never" willing to sell or willing to sell only if paid more than $500) and that it is affected by framing effects.

Third, a lack of salience (Smith, 1982) of the privacy issue may cause the values elicited to be rather low in some studies. Specifically, field studies often avoid emphasizing that the purpose of the experiment is an elicitation of one's willingness to sell data, so the realistic field setting may effectively serve as a decoy. The "unwillingness to pay for privacy" (Beresford et al., 2012)[3] under such conditions is an important and policy relevant finding. In common situations people face every day, for example, when shopping online, privacy issues may not be obvious to them and may hence be overlooked. In an incentivized experiment, Tsai et al. (2011) vary the salience of the shops' privacy policies and report that increased salience triggers a preference for stores with better privacy policies. The downside of emphasizing privacy issues may be a demand effect.

Fourth, Acquisti, John, and Loewenstein (2009) find evidence of a gap between "willingness to buy" and "willingness to sell" privacy. Depending on whether subjects consider the sum of money they would pay to protect otherwise public information or the sum of money for which they would sell otherwise personal information, participants in an experiment assign significantly different values. It turns out very few people are willing to spend money to protect their data but many people would decline an offer to sell the same data for a similar price.

In our study, we elicit the willingness to sell personal data, addressing these points. We employ incentivized laboratory experiments, avoiding the hypothetical bias of non-incentivized methods. We clearly and distinctly state how the data to be bought is to be used: the data were given to a large and well-known telecommunications company for marketing purposes and would not be forwarded to third parties. As long as participants trusted this company regarding privacy issues, there was no ambiguity about the use of the data. Finally, we assess the willingness to sell rather than the willingness to buy the protection of personal data. For the type of information we are analyzing (contact data, Facebook details), it does not seem straightforward to design a willingness to buy experiment.

Our aim is to elicit privacy values in a transparent and incentivized laboratory setting—

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[3] In their incentivized experiment, (Beresford et al., 2012) observe a rather low willingness to pay for privacy when participants can choose whether to buy DVDs in two different online stores. The stores only differ by the amount of personal information the buyer has to submit. Even when both stores charge the same price, participants do not buy significantly more often in the store requiring less information for the purchase. Perhaps, it was not sufficiently apparent to subjects that in one of the shops they had to provide more personal data.

which is not to claim that this is the only valuable method. As mentioned above, to study an ambiguous use of the data has interesting policy implications. The same holds for field experiments where the treatment of the data is non-salient, and for contingent evaluation methods. However, we believe that an incentivized experiment where the sale of personal data is clearly the purpose of the investigation and where the first and secondary use are transparent will fill an important gap in the literature.

One novelty of our experiment is that it is, to our knowledge, the first study to elicit reservation prices for data from a social network (Facebook).[4] The data to be sold (Facebook's "About" and "Timeline" categories) contain a wealth of information not only about the participants but also about their friends and contacts. Thus, there seems to be a lot at stake here, suggesting a low willingness to sell. On the other hand, companies running social networks have been repeatedly accused of being too careless with respect to privacy issues. So one could argue that this information is sort of public anyhow. Moreover, people who have a Facebook account may be a biased sample; indeed, unreserved posting behavior on Facebook pages often serves as an example that people can be rather careless about their personal data. Either way, it seems interesting how participants evaluate data stored on Facebook. We elicit these data in a non-hypothetical, incentivized manner.

Our main results are as follows. We find that only a minority of about 10% to 20% are unwilling to sell personal data, a share which is roughly constant across the type of data we ask for and the elicitation method. Subjects who are willing to sell request about € 15 for their contact details and € 19 for Facebook details.

2   Experimental Design and Procedures

We conduct a series of incentivized experiments to elicit subjects' willingness to sell personal data. We employ the mechanism proposed by Becker, DeGroot, and Marschak (1964) and take-it-or-leave-it offers.

2.1   The Becker, DeGroot and Marschak mechanism (BDM)

The Becker et al. (1964) mechanism is a standard way to figure out for how much an individual is willing to sell an item for. It precisely elicits an individual's willingness-to-pay for goods or lotteries, much like a second-price auction.[5]

We implemented the BDM as follows. Subjects had to state the minimum amount of money they would accept in exchange for an object they could sell to the experimenters.

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[4]   Stutzman, Gross, and Acquisti (2013) study whether Facebook users changed their privacy and disclosure behavior between 2005 and 2011. The authors find evidence for an increasing awareness of privacy issues among Facebook users.

[5]   Karni and Safra (1987) show that the BDM is not incentive compatible when individuals are not expected utility maximizers.

The valuation of the experimenters was then determined by a random draw. If this valuation exceeded the minimum price claimed by a participant, the object was sold and the subject received the randomly determined valuation as a payment. If the price claimed exceeded the valuation of the experimenters, the participant kept the object but did not receive any money.

Because the BDM procedure can be rather demanding, we made several arrangements to familiarize the participants with the mechanism. Before we elicited the subjects' willingness to sell personal data, we endowed them with a coffee mug they could sell back to the experimenters (fully incentivized). Following Grether and Plott (1979), we stressed that subjects had an incentive to state their true valuation and that renegotiations were excluded. We also clarified that the random draw was independent of actual choices. Finally, subjects also had the possibility to conduct several tests with different prices and random draws using a payoff calculator that displayed the hypothetical outcomes before making their actual choices.

In our BDM experiments subjects were told about the support of the random draw (between € 0 and € 50) before actually deciding on their minimum price. This is not without loss of generality. Bohm, Lindén, and Sonnegård (1997) find that BDM-elicited valuations are sensitive to information about support. Specifically for our good (personal data), subjects may find it difficult to indicate their true valuation because a "realistic" selling price is not readily available. Information about the support may thus anchor subjects' decisions. The anchoring effect can work either way. On the one hand, we find that not too many subjects ask for more than the upper bound we imposed. This may suggest that the anchoring effect reduces some subjects' willingness to sell. On the other hand (as indicated in the introduction), realistic market prices for the kind of information we try to buy from subjects are far below € 50. In that case, the anchoring effect may inflate decisions.[6] We regard the second possibility as more relevant and therefore employed the take-it-or-leave-it variant which does suggest a high but still feasible price for the data (see below).

2.2 The take-it-or-leave-it (TIOLI) mechanism

In the take-it-or-leave-it (TIOLI) experiments, subjects had the possibility to complete a printed form asking for personal information. Everyone who agreed to fill in the form received € 5. The possibility not to fill in any forms was emphasized multiple times. In this case they did not receive € 5.

The TIOLI sessions were conducted at the end of experiments that were unrelated to this study. After the unrelated experiments were completed (including payoff information), subjects were given the form and were told about the possibility of gaining an

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[6]   One alternative is to not give any information at all about the upper bound of the support. This may, however, trigger excessive bidding should subjects misunderstand the BDM.

additional € 5. We control for the earnings and the type of the unrelated experiments. At the end of the session, subjects were paid for the experiment they had initially participated in plus, possibly, the € 5.

2.3 The data to be sold

In both TIOLI and BDM, subjects were asked to sell different bundles of personal information to a telecommunications company. They were informed that the data would be used for market research, including marketing calls and mailings. We emphasized that the information sold would not be disclosed to other parties and that subjects could always choose not to sell any information. In this case subjects did not have to provide any information whatsoever. We neither requested information when a subject's reservation price exceeded the random draw.[7] Moreover, subjects were made aware of the fact that they were expected to provide complete and truthful information if they did decide to sell the data.

The experiments covered five different bundles of personal information subjects could sell. One bundle was anonymous, but the other bundles contained information that was linked to the subject's name. The following list contains a brief summary of the different data bundles used in the experiments:

1. **Preferences:** anonymous, contains questions on hobbies, political views, shopping behavior and income, together with questions on date of birth, gender, field of studies and/or occupation.

2. **Contact data:** not anonymous, contains questions on the subject's name, address, e-mail address, and cell phone number.

3. **Combination:** not anonymous, contains all the questions from the Preferences and Contact data bundles.

4. **Facebook About:** not anonymous, subjects are asked to sell a digital copy of their personal About page on Facebook.

5. **Facebook Timeline:** not anonymous, subjects are asked to sell a digital copy of their personal Timeline page on Facebook.

In bundles one to three, participants were asked to fill out printed forms. The experimental procedures ensured that subjects selling one of the non-anonymous bundles stated their correct name and that the Facebook profiles carried the subject's real name. When arriving at the lab all participants had to identify themselves using their student ID

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[7] That information only had to be provided if a subject was willing to sell is in contrast to some experiments where the personal information has to be provided to the experimenter even if the subject is not willing to sell (e.g., Huberman, Adar, and Fine, 2005).

card, government issued ID card, or driver's license, and the data they sold was verified as correct.

Bundles four and five had to be provided in the form of a download of some of the information stored in the subjects' personal Facebook accounts. These downloads were conducted using the standard "Save as" feature of the web browser. The data were downloaded onto the hard disk of lab computer. The downloads could not be manipulated, nor could the data be restricted in some way. The Facebook data were stored in HTML format including all pictures, etc. Note that these data sets comprise all entries from the corresponding Facebook page—even very old ones. This was demonstrated to the group of subjects at the start of the experiment in a brief beamer presentation. An actively used Facebook account was a requirement for participation in these experiments.[8]

2.4 Procedures

The BDM sessions followed a within-subjects design to elicit the valuations for different data bundles at the same time. There are, however, two different variations of this. In the first version, subjects sequentially state their reservations prices for the Preferences, Contact data and Combination bundles. It was made clear that, in the end, only one of these bundles would be payoff relevant. Put differently, subjects were only paid to complete one of the printed forms which was selected at random. The second BDM experiment uses the same within-subjects design and tackles the Facebook About and Facebook Timeline bundles.

We conducted TIOLI offer variants for the Preferences, Contact Data and Combination bundles separately. Note that it is virtually impossible to conduct a TIOLI variant for the Facebook data because the procedure takes rather long and because not all participants have a Facebook account.

	Preferences	Contact data	Combination	About	Timeline
BDM		89			39
TIOLI	24	42	42	NA	NA

Table 1: Combinations of method and data bundle and the corresponding number of participants.

Table 1 summarizes the different combinations of experimental methods and data bundles in the incentivized experiments. All these experiments were conducted at the DICELab on the campus of the university of Düsseldorf and all sessions took less than one hour. The BDM experiments were conducted using z-Tree by Fischbacher (2007). The

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[8] The exact requirements were: at least 50 contacts, has existed for at least one year, and is attributed the subject's real name.

TIOLI sessions were done with pen and paper. Participants of the laboratory experiments were recruited using Greiner's (2004) ORSEE software. We had 236 participants in these laboratory experiments.

3 Results

In this section we present the results from our incentivized experiments. First, we address the BDM experiments and then the TIOLI results. Finally, we present a brief comparison and an interpretation of these results.

3.1 BDM

In the BDM experiments, subjects were asked to state the minimum price at which they were willing to sell their data. They also had the possibility to flatly reject the offer by selecting an option labeled "I will not sell not on any account." Despite this possibility, several subjects entered very high prices (up to € 100 million) which would inflate the average reservation price. As a consequence, we disregard all prices that exceed the € 50 threshold of the random draw when calculating the mean reservation prices. For the calculation of percentiles we assume that subjects flatly refusing to sell their data have an infinitely high reservation price and include them in the calculations.

Table 2 shows that among most subjects there is a general willingness to a accept monetary offer in exchange for private data. The highest willingness to sell occurs for the Preferences bundle where 87 of 89 agreed to provide their data. The Contact data and Combined treatments have significantly lower willingness to sell (McNemar exact tests, all $p < 0.01$). The lowest values occur for the Combination bundle (70 of 89 subjects) and the Facebook Timeline (31 of 39). These two bundles are not significantly different from each other (Fisher exact test $p \geq 0.999$). Also note that there is no significant difference concerning the two Facebook data bundles (McNemar exact test, $p = 0.500$).

	n	willing to sell	mean	median	80%ile	90%ile
Preferences	89	87 (97.8%)	8.32	5.00	15.00	25.00
Contact data	89	78 (87.6%)	14.88	12.50	40.00	200
Combination	89	70 (78.7%)	18.90	25.00	80.00	∞
Facebook About	39	33 (84.6%)	17.67	20.00	45.00	∞
Facebook Timeline	39	31 (79.5%)	19.49	25.00	∞	∞

Table 2: Summary of reservation prices under the BDM conditions. Notes: "willing to sell" is the share of participants willing to sell at a price $p \leq 50$; "∞" indicates that more than 10% of the participants are not willing to sell their data at all.

The last columns of Table 2 summarize mean and median reservation prices as well

as some higher percentiles (the latter are included to document some of the outliers that were disregarded in the calculation of the means) for all five data bundles. Subjects who are principally willing to sell data request the lowest prices for the anonymous Preferences (€ 8.32) and the highest prices for Combined and Facebook Timeline (about € 19 to € 20 on average). We find that the prices requested for Preferences are significantly lower compared to Contact data and that the prices requested for Combination are significantly higher compared to Contact data (two-sided Wilcoxon signed rank tests, $p < 0.001$ in both cases). As for the Facebook treatments we do not find a significant difference concerning the prices requested for the About and the Timeline page (two-sided Wilcoxon signed rank test, $p = 0.714$). The majority of the subjects chose the same price for either Facebook page.

Figure 1 visualizes the distributions of the reservation prices as elicited using the BDM design. The figure emphasizes the findings we reported above. For (nearly) any price the willingness to sell Contact data is higher compared to Combination and lower compared to Preferences. As for the two Facebook data sets, there are hardly any differences in the distributions.
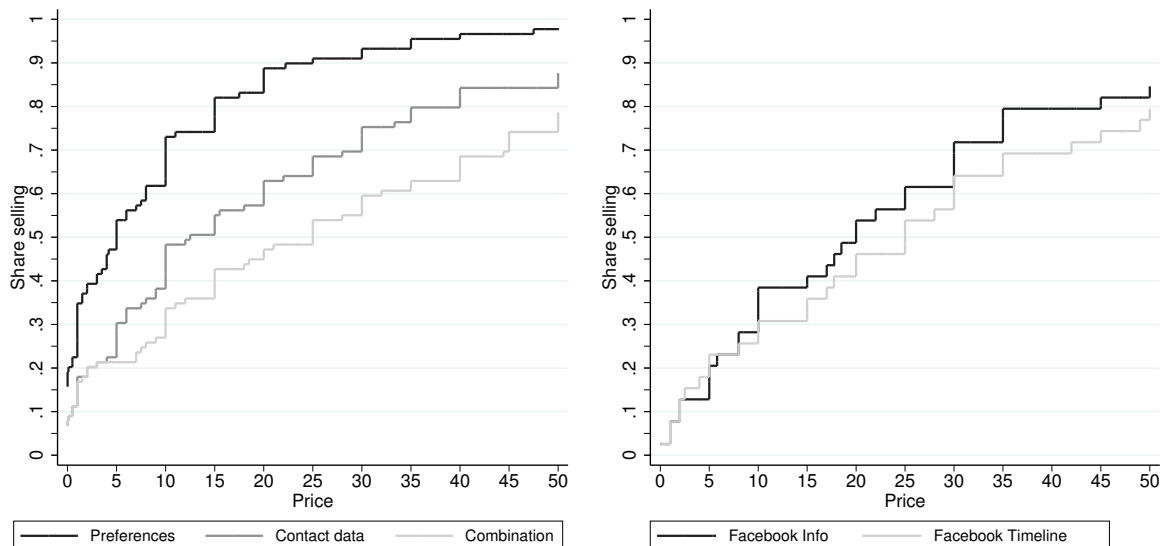

Figure 1: Cumulative distribution of prices for data bundles, Preferences and Contact data (left panel), Facebook data (right panel).

The results regarding the Facebook treatments seem worth commenting on: 33 and 31 of 39 subjects consented to provide copies of their About and Timeline pages on Facebook, respectively. This is significantly above a 50% level suggested by randomization (binomial test, $p < 0.001$). The share of participants generally willing to sell as well the selling prices are roughly comparable to the values obtained in Combined. On the one hand, this makes sense in that both data bundles involve contact data as well as content about preferences or other personal issues. On the other hand, the Facebook bundles are much more detailed and also contain data on third parties (Facebook's "friends"). Apparently, this externality

on others is ignored when selling decisions are made.

3.2 Take-it-or-leave-it offers

In these experiments subjects were offered a lump sum of € 5 if they consented to disclose their personal data for marketing purposes. These offers were made at the end of two other, unrelated experiments that were labeled "RL" (a coordination game on cartel stability) and "P2" (a labor market experiment).

Data	total	willing to sell	percent
Preferences	24	24	100.0%
Contact data	42	35	83.3%
Combination	42	35	83.3%

Table 3: Number of participants willing to sell their data for a lump sum of € 5.

The results from the TIOLI experiment can be seen in Table 3. We find that all participants accepted the offer for the anonymous Preferences data bundle whereas the Contact data and Combination bundle were accepted by 35 out of 42 subjects. The rate for Preferences is significantly different from the other two treatments (Fisher's exact test, $p = 0.042$). This is also captured by the probit regressions in Table 4 where the dummy variables for Contact data and Combination are significantly negative.

	(1) sold data	(2) sold data	(3) sold data
Payoff	-0.0986	-0.0876	-0.0970
	(0.0827)	(0.0780)	(0.0793)
Contact data		-4.507***	-4.556***
		(0.325)	(0.413)
Combination		-4.498***	-4.544***
		(0.220)	(0.215)
Experiment "P2"			0.254
			(0.262)
Constant	2.951*	7.089***	7.211***
	(1.537)	(1.440)	(1.467)
Observations	108	108	108
Standard Errors adjusted for 8 clusters (sessions)			
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$			

Table 4: Probit regressions on TIOLI acceptance.

We find no spillovers from the experiments preceding the TIOLI sessions. The probit regressions in Table 3 control for the money earned in the first experiment ("Payoff") and which of the two different experiments was used ("P2"). Neither Payoff nor Experiment "P2" have a significant impact on the inclination to sell data.

3.3 Comparison

Figure 2 displays the acceptance rates in TIOLI and BDM for the three data bundles that were considered in the TIOLI treatments. We include two data series from the BDM treatment: the share of subjects willing to sell their data for €50 and the share of subjects willing to sell their data for €5. These shares also include all subjects with lower reservation prices. The data series are referred to as "BDM-50" and "BDM-5", respectively. The TIOLI data depicts the share of subjects that accept the €5 take-it-or-leave-it offer.
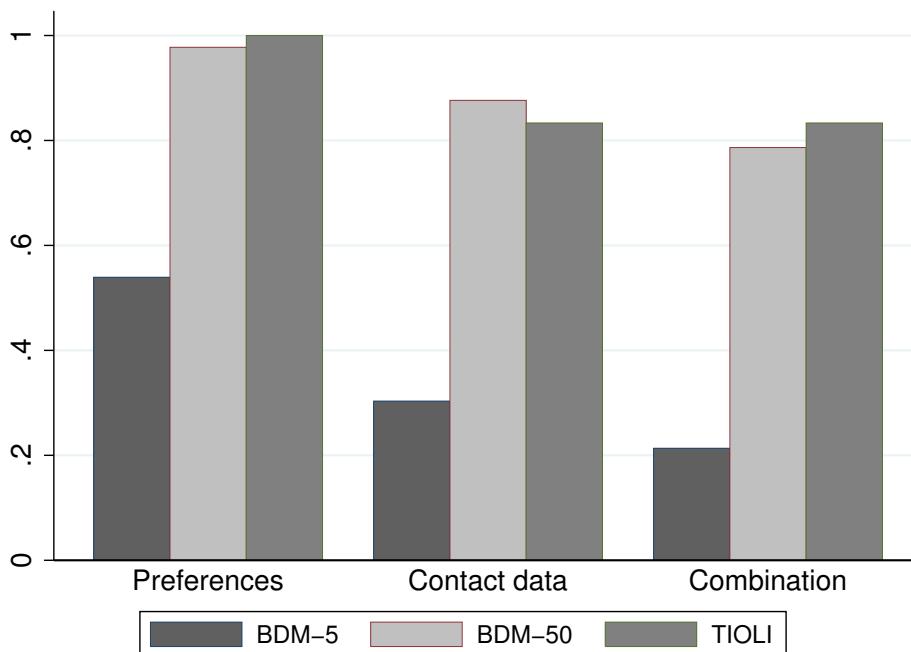

Figure 2: Comparison of the share of subjects willing to sell information across treatments and data bundles.

We find that the share of subjects who agree to sell their data for €50 in BDM is virtually identical to the share of subjects that accept the €5-TIOLI offers. That is, the share of subjects who are in principle willing to sell their data is the same. In both treatments nearly all participants hand over their Preferences data. For Contact data and Combination where about 75% to 80% are willing to sell in both treatments. None of these differences are significant (Fisher exact tests, $p > 0.999$, $p = 0.558$ and $p = 0.642$ for Preferences, Contact data and Combination, respectively).

Having said that, the TIOLI offers are accepted more frequently than suggested by

the "BDM-5" data where far fewer subjects were prepared to sell their data for € 5. For instance, while literally all subjects accepted the TIOLI offer for the anonymous Preferences bundle only about 53.9% would have sold the same data for the same price in "BDM-5". Figure 2 documents that the same pattern applies for Contact data and for Combination. The willingness to sell for € 5 is significantly lower in "BDM-5" compared to TIOLI (Fisher exact tests with $p < 0.001$ in all three cases).

4   Survey

We have access to data from a non-incentivized survey on the German population's attitude toward privacy issues.[9] It addressed a representative sample of the German population. In total 460 males and 540 females aged between 18 and 94 were questioned via telephone interviews. Their answers were weighted in order to achieve representative results. Subjects were not paid for their participation.

Sample	all	young
Contact data such as address or telephone number	7.27%	12.09%
Personal information such as sex or birthday	6.62%	11.83%
Data like the one in social networks	4.50%	12.47%

Table 5: Disposition to provide personal data for commercial uses when being paid (hypothetically).

Some of the survey questions were directly related to the decisions subjects had to make in our incentivized experiments and can therefore be used as a benchmark for our experimental findings. Here, subjects were asked whether or not they would agree to a commercial use of their data if they received a monetary remuneration in exchange. Table 5 lists the share of subjects indicating their consent for different sorts of data. The column "All" refers to the entire representative sample whereas "Young" only includes the answers of the 18 to 29-year-olds. We include this differentiation since about 90% of the participants in the incentivized experiments were between 18 and 29 years old.

In the non-incentivized survey subjects show very little disposition to sell their data for commercial uses. Only about 12% of the 18 to 29-year-olds give their consent for all data bundles. This is in strong contrast to the behavior we observe in our incentivized experiments where a vast majority of the participants agreed to sell the same data for commercial usage (see Figure 2). In fact the shares are even pretty much reversed.

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[9]   See Handelsblatt Research Institute (2013) for a description of the data. The data assessment was conducted by Forsa, a well-known German research company who gave us access to the raw data.

5   Conclusion

In this paper we elicited subjects' valuations for privacy in a controlled laboratory experiment. We use the mechanism proposed by Becker et al. (1964) (BDM) and take-it-or-leave-it offers (TIOLI) to elicit values. Our experiments were fully incentivized in order to avoid a hypothetical bias. The purpose of the data acquisition was transparent to our participants. There was no ambiguity about the use of the data. Finally, the focus of the experiments – privacy – was salient.

We find that about roughly five of six participants are willing to sell personal data for commercial usage. This share is constant across both our treatments. In TIOLI these participants sold their data for € 5. In the more sophisticated BDM design we elicited participants' precise reservation prices. Here, subjects requested on average € 15 for their contact data and about € 19 for detailed information from their personal Facebook accounts.

At the same time there is a minority of roughly one in six participants who persistently refuse to sell personal data. This share is also roughly constant across our treatments. The corresponding participants do not fall for the take-it-or-leave-it offers and in BDM they waive up to € 50 to keep their data private. This suggests that these subjects have a truly high valuation for privacy.

A comparison of the BDM and TIOLI results yields an additional interesting insight. The share of participants willing to sell for € 5 or less in the BDM sessions is significantly smaller than the share of subjects selling in the € 5 TIOLI variant. This suggests that the elicitation method has an impact on valuations. Bohm et al. (1997) also made this point regarding different BDM variants. Above, we saw that previous studies suggest highly diverse figures regarding the willingness to sell. We can now add that the specific elicitation method used may also affect the results.

We also find evidence for a hypothetical bias that occurs when privacy attitudes are researched using non-incentivized methods. Recent survey data we analyze suggests that a vast majority (about five in six people) has strong concerns for privacy issues and that very few people would disclose private data in exchange for money. However, our incentivized experiments show the exact opposite. This discrepancy has long been labeled "privacy paradox" (see Syverson, 2003).

Last but not least, our experiment is the first to analyze the willingness to sell data from a social network (Facebook). The share of participants generally willing to sell, as well as the selling prices, are roughly comparable to the values obtained when we elicit contact details plus personal preferences. However, the Facebook data also contain information on third parties (Facebook's "friends"). It appears that participants ignore this externality on others. While this would be consistent with standard (non-other-regarding preferences), this attitude would be worrisome from a data protection perspective.

The conclusions we can draw from this paper are not unambiguous. On the one hand,

policy makers should probably not rely on purely hypothetical data when evaluating privacy issues since there is a substantial bias in such data. Many people exaggerate their true valuation for privacy in such hypothetical setups because stating a high valuation does not come at a cost. A regulatory policy relying on hypothetical studies may be biased as a result, too. On the other hand, there is a persistent minority who have considerable concern for privacy. Since these people demonstrate substantial valuations for privacy, their potential losses may therefore outweigh the potential gains from policies that come with a reduction of their privacy.

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A   Instructions/Procedures for BDM

This section describes the instructions subjects were given for the BDM experiments. Unlike other experiments the instructions were not distributed as printed handouts but were presented on the participants' computer screens as a part of the z-Tree program. Additional information was given via oral announcements. In the following we describe these announcements as well as the text that was displayed on subjects' screens in the course of the experiment.

Screen 1: *Information screen for the mug. A picture of the mug was displayed but we also distributed some samples of the mug such that subjects could examine it. We did, however, collect the samples before subjects made their decisions.*

The first part of the experiment is about a coffee mug you will get from us. You will have the opportunity to sell the mug back to us. You can see a picture of the mug below.

The selling procedure works as follows: On the next pages you will be asked to enter the minimum price at which you are willing to sell the mug. The actual price will be determined by a random draw of the computer. If this random draw is lower than the price you have entered, you will keep the cup. If it is higher you need to return the mug to us and we will give you the price in cash as determined by the random draw. Please note that it does not make sense to enter prices exceeding your true valuation. By doing so you will only lose money. If your valuation of the mug is for instance € 1, you should enter € 1 as your reservation price. If the random draw decides that we pay a price of € 4, you will receive € 4 even if the reservations price you entered was only € 1. However, if you have entered a reservation of € 5 you will keep the cup and not receive any money at all.

Screen 2: *Simulation screen. Here, subjects received additional information orally. For instance, that subjects' decisions would be final and that no renegotiations would take place. We also emphasized that the randomly determined price was independent of subjects' reservation prices. The screen contained a repetition of the description of the selling procedure from Screen 1 and the following text:*

Simulator: Here you can simulate the selling process of the mug. Below, you can enter different reservation prices. Whenever you click the "simulate" button the computer will perform a random draw determining a hypothetical price. On the right-hand side you will see whether or not you would have sold the mug and how much money you would have earned. These simulations are completely hypothetical and do not affect your payment. Note that we will certainly not pay more than € 8 for the mug.

Screen 3: *Decision screen for the mug. Subjects were presented with an input field to enter their minimum price but they were also given the possibility to check an option "I will not sell not under any account". If this option was checked no price could be entered. Once again we emphasized that the decisions were final and that no renegotiations would take place. We stressed that the support of the random draw was inbetween € 0 and € 8 and that the random draw was independent of the prices subjects were about to enter.*

Please make your actual decision now. Below you can enter the minimum price at which you are willing to sell the mug. Note that we will not pay more than € 8.

Screen 4: *Result screen for the mug. Screen 4 was summarized the result of the random draw, repeated the subject's decision, and displayed whether or not the subject had sold the mug.*

Screen 5: *End of part 1. Here subjects were informed that the process of selling the mug was only conducted to familiarize them with the selling procedure and that the actual experiment was about their privacy attitudes. We stressed that the data sold would actually*

be transmitted to [name of the company] and that market research also covered marketing actions. The different forms were distributed to the subjects to make sure they knew what kind of data they were supposed to sell. We emphasized that subjects were expected to fill in all the fields of the corresponding form and that their answers had to be truthful.

Market research: [name of the company] would like to purchase some personal data of yours for the purpose of market research. More precisely, there are three different printed forms one of which you will need to complete if you decide to sell the corresponding information.

- The first form contains questions concerning: gender, date of birth, field of studies/occupation, hobbies, income, political attitude and buying habits. This form is anonymous. The data will not be linked to your name.

- The second form contains questions concerning your contact information: Name, address, mobile number and email address. This form is not anonymous.

- The third form is a combination of the first two forms. This form is also not anonymous.

On the following pages you can determine the minimum price you request for selling your data to [name of the company]. [name of the company] will not disclose your data to any third parties. You have full control over your data during the entire experiment. If you do not sell your data no data whatsoever will be transmitted. However, if you decide to sell your data you will receive the corresponding payment in cash at the end of the experiment. At the end of the experiment a random draw of the computer will determine which form is relevant for the payment. Only one of the three forms will be transfered to the [name of the company]. Therefore, you have to fill in one form at most.

Screen 6: *Information screen for form 1.*

Please determine your reservation price for completing form 1 and selling it to [name of the company] for the purpose of market research. Form 1 concerns details about gender, date of birth, field of studies/occupation, hobbies, income, political attitude and buying habits. There will be no linkage to your name. The data remains anonymous. The selling procedure is identical to the one for the mug. You should enter the minimum price at which permit us to transfer the above mentioned data to [name of the company]. The actual price will be determined by a random draw of the computer. If this random draw is lower than the price you have entered, we will not transfer your data. If it is higher, [name of the company] will receive your data and you will receive the price in cash. Please note that it does not make sense to enter prices exceeding your true valuation. By doing so you will only lose money. Note that we will certainly not pay more than €50 for this data package. [name of the company] will not disclose your data to any third parties.

You have full control over your data during the entire experiment. If you do not accept a transfer, no transfer will take place.

Screen 7: *Decision screen for form 1. Analogous to Screen 3 except for the reference to the mug and the support of the random draw.*

Screen 8-11: *Information and decision screens for the forms 2 and 3. Analogous to screens 6 and 7 but emphasizing that the data to be sold was not anonymous.*

Screen 12-13: *Screens summarizing the results of the random draws and participants payoffs from the experiment.*

The experiments concerning the Facebook data were conducted analogously. The screens 1 to 4 were literally identical to the ones described here. The remaining screens and announcements referred to the Facebook pages instead of the printed forms. The corresponding information screens contained screenshots of the Facebook pages that were taken from a fake account of the experimenters. Moreover, subjects were asked to open a web browser and log into their own Facebook account to get an impression of the data they were about to sell. It was emphasized that these downloads would also contain all pictures etc. and that we would store the entire pages including the very first entries of the corresponding account.

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