Awards as Incentives

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Abstract:

Standard economic theory considers monetary incentives only. Awards have so far escaped the attention of economists despite their widespread use. This paper presents an experiment conducted online at IBM to assess the impact of these kinds of extrinsic incentives. Introducing a hypothetical award has statistically significant effects on stated contributions to a public good. Our design allows the estimation of the impact of different award characteristics related to, for example, how public or how valuable the award is. We illustrate these findings by providing predictions about the behavior induced by a new award at IBM.

JEL classification: C99, J33, M52

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1. Introduction

Awards are present just about anywhere one looks in society, but they have nevertheless been neglected in economics as incentive instruments. They are used extensively by states in the form of decorations and medals. In arts, culture, sports and media, awards are also of central importance. A few prominent examples are the Academy Awards (Oscars) or Halls of Fame in sports. Academia also has an elaborate and extensive system of awards. Just consider the abundance of titles such as ‘honorary doctor’ or ‘honorary professor’ or the various prizes, the most important examples being the Nobel Prizes and the Fields Medal. Surprising is the widespread use of awards in the corporate sector of market economies where one would expect monetary compensation to be the only effective means of motivation. Titles are also very important and often little related to functions. What manager is not, at the very least, a vice-president, or preferably, a senior vice-president, or even a first senior vice-president? Companies also honor their employees as “Employee of the Month”, or with “Bravo!-“ or “Thanks!-Awards”; there seems to be no limit to the creation of ever new awards.

This paper presents a survey experiment on awards as incentives in principal-agent relationships. The experiment was conducted online with the employees of the IBM research lab in Rüschlikon, Switzerland. In the survey, we focus on the quantitative effect of introducing an award on work behavior and analyze what award characteristics determine the size of the effect. We asked the employees to state their willingness to contribute to a public good in their current work environment as well as in four different scenarios, each of which represented the introduction of a new award for international cooperation at IBM. The awards differed with respect to whether they were accompanied by cash bonuses or gifts, the monetary value of the bonus or gift, the number of award recipients, and the degree of publicity associated with winning the award. Further we simulated a situation in which the respondents were told that they either did or did not receive the award. This addresses the question about the behavior of both winners and losers upon receipt.

3 Specifically, we asked about their willingness to share an important finding with their work group. Sharing increases team productivity, but entails the risk that no or only part of the scientific credit for the finding will be attributed to the researcher personally. The alternative to sharing immediately is to wait, publish the finding under one’s own name, and only then share it with the team.
We find that respondents react systematically to the announcement of the award: the willingness to contribute increases monotonically with the value of the monetary payment or gift that comes with the award and is lower for gifts than payments of equal value. Both of these findings are in line with standard economic theory. Further, contributions are significantly higher for awards whose winners are publicized within the company and for awards whose winners are celebrated in a public ceremony. While this can be rationalized with standard theory in terms of reputation formation, it is unlikely that this explains the whole effect. It is more plausible to assume that at least part of the large incentive effect of ceremonies is caused by concerns for social recognition. The design also allows us to study the change in motivation induced by receiving or not receiving the award. We find that non-recipients decrease and recipients increase their stated contributions as compared to the motivation they indicated before the award was announced. Both effects are debated in the literature. After all, why should a person increase her contribution upon receipt? Or why should she decrease her contribution when not receiving the reward since she can still win the award in the future? Overall, we conclude that awards have a significant impact on motivation and induce systematic changes in behavior. Therefore, awards have the potential to serve, and should be taken seriously, as incentive instruments in economics.

The following section provides an overview of the literature relevant to the study of awards. Section 3 describes the vignette technique, set-up of the study, as well as the theories guiding the research design. In section 4 we present the results and section 5 concludes.

2. State of Research

Despite the importance of awards in society, economic research has largely disregarded them. There may be various reasons for this neglect. Firstly, awards may be considered inferior instruments for inducing effort as compared to monetary compensation because they are not fungible. Secondly, awards may just be one result of high motivation and success and not a contributing cause. Thirdly, awards may not be seen as different from monetary incentives, assuming that they are only valued by the recipients due to the ancillary bonus or to the extent that they induce increases in future income. This idea certainly has some truth to it. However, it has also been
demonstrated experimentally that people value status independently of any monetary consequence; they are even willing to incur material costs to obtain it (Huberman et al., 2004).

While awards per se have not received much attention in the literature, several aspects important for the functioning of awards have been studied in isolation. One of these is status, i.e. relative positioning of an individual within a group, a topic that has received increasing attention by economists in recent years. This literature is based on the finding that individuals have an innate desire to distinguish themselves from other individuals. People are more concerned with their relative rather than their absolute standing (e.g. Veblen, 1899, Frank, 1985, and Zizzo, 2002). It follows that social distinction enters the utility function directly and that awards have the potential to change behavior when they have an impact on an individual’s social distinction independent of their impact on present or future consumption.4 Our topic is related to those works within this literature that address the role of status in the workplace, specifically the research addressing how status considerations can be used as incentives (e.g. Auriol and Renault, 2001, 2004, Bandiera et al., 2005, Dubey and Geanakoplos, 2005, Ederer and Patacconi, 2004, Loch et al., 2001, and Fershtman et al., 2001).

Awards, however, are more than simply status. Awards also influence behavior by providing positive feedback and social recognition. Social recognition refers to social endorsement irrespective of changes in relative position, while relative position defines a person’s status. In general, the idea that people seek approval is accepted in economics (e.g. Smith, 1753, Offer, 1997), even that social approval is important for self-esteem (Veblen, 1899, Cowen and Glazer, 2007). However, little work has been conducted on these topics. Rare examples of an analysis of social recognition above and beyond status considerations are Brennan and Pettit (2004) and English (2005). Sururov and van de Ven (2006) have recently studied rewards as feedback mechanisms. Awards also work, because employees are concerned with fairness and reciprocity (e.g. Fehr and Gächter, 2000, Fehr and Schmidt, 2004, or Fehr and List, 2004). Employers can use awards to signal positive intentions and thereby influence the effort of an agent. Moreover, the study of awards is related to the economic

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4 The demand for awards is more fully discussed in Frey (2005, 2006, 2007).
literature on signaling (e.g. Spence, 1973, 1974) and tournaments (e.g. Lazear and Rosen, 1981). Of course there is an enormous literature on incentives that is related to the topic of awards (see the surveys by Daily et al., 2003, Prendergast, 1999). Frey and Jegen (2001) provide a survey over the evidence indicating that monetary compensation does not always work well. This holds, in particular, when the task to be performed is difficult or impossible to specify ex ante or to monitor ex post. In this case, it is hard to make a monetary payment that is considered to be fair by the recipients. “Soft” incentives (e.g. Holmstrom and Milgrom, 1991, 1994), which endeavor to take a broader view of the agents’ efforts, become more useful then.

Even though economics has not generally considered awards as incentives, there is literature on the different channels via which awards work. Nonetheless, economics has not addressed awards in a cohesive fashion that combines considerations of status and esteem, positive feedback, and material benefits. Rare exceptions include analyses of non-monetary incentives (e.g. Prendergast, 1999, Clark and Riis, 1998, Ward and Sloane, 2000, Prendergast and Stole, 2001, Jeffrey, 2004) and specific prizes in the arts or music (e.g. Ginsburgh and van Ours, 2003, Ginsburgh, 2003, and Glejser and Heyndels, 2001). Bielby and Baron (1986) and Malmendier and Tate (2005) address titles and awards in the corporate sector. Only Hansen and Weisbrod (1972), one isolated precursor, and the unpublished notes by Besley (2005) study awards more generally. Frey and Neckermann (2006) identify the differences between monetary compensation and awards and discuss why awards should be considered as separate incentive instruments.

Studying awards is a truly interdisciplinary undertaking. In other disciplines there is a substantial body of literature on awards or related issues such as status and social recognition. Awards and status have for instance been an important topic in sociology (e.g. Bourdieu, 1979, Elster, 1983, Braudy, 1986, Marmot, 2004, and de Botton, 2004) and management (e.g. Borins, 1999, 2000). The psychological literature provides important insights into the mechanisms via which awards work at the individual level. For an overview of this literature and a survey of studies investigating the effects of different stimuli see Stajkovic and Luthans (2003). However, with few exceptions,

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5 The various reinforcers (stimuli) used in behavior modification in organizational settings can be classified into the following types of interventions: (1) financial/monetary, (2) non-
these works either address awards and distinctions in a general and abstract way (and not as incentives), or they study specific prizes. Further, they do not use a comparative perspective. Hence, this literature is largely silent about the types of tasks and situations for which one can expect awards to be successful motivators. Further, we are unaware of studies that assess the impact of individual stimuli (feedback, money, publicity) when two or more of them are present simultaneously, as is the case when awards are used. This paper addresses this issue.

3. Design of the study and operationalization

3.1. The vignette technique

We use the vignette study technique, also known as conjoint analysis, factorial survey, or discrete choice experiment. In vignette studies, subjects are presented with short descriptions of hypothetical situations called vignettes and asked to indicate their behavior if they were in the described situation. Each vignette consists of randomly selected values for each vignette dimension. The vignette dimensions are the factors that define the situation and represent those variables whose impact on behavior the researcher wants to study. The systematic variation of the values in the different dimensions allows the researcher to estimate the effects of changes in combinations of variables as well as changes in individual variables. Participants typically respond to a number of different vignettes. Every respondent receives a random sample of vignettes from the space of possible vignettes (i.e. combinations of different values for each of the vignette dimensions). For a general introduction into the method and further methodological information see Rossi and Anderson (1982).

While vignette studies are very common as a research tool in sociology (e.g. Opp, 2002 or Jasso and Opp, 1997), business administration/marketing (e.g. Beggs et al., 1981), and health economics (e.g. San Miguel et al., 2002, Thurman et al., 1988, or Kapteyn et al., 2007), the method has not been used in behavioral economics. The only exception we are aware of is Falk and Kosfeld (2006), who use the vignette technique to assess the impact of control on effort in the workplace.

financial, (3) social, and (4) various combinations (simultaneous use) of two or more types of reinforcement. Awards belong to category (4).

6 McFadden (2001) discusses conjoint analysis as a method for eliciting stated preferences within a classical experimental design. Various methodologies to elicit preferences both via revealed behavior and stated preferences are analyzed and compared in Hensher et al (1999).
3.2. Comparison with other techniques and discussion of reliability

Alexander and Becker (1978) compare vignette studies to more traditional survey methods and conclude that traditional surveys often elicit unreliable and biased self-reports since the questions are too abstract. Vignette designs solve this problem by presenting subjects with a stimulus that is precisely specified and that closely resembles real-life decision-making situations. In particular, respondents evaluate a complete situation description (bundle of different factors), rather than having to state how isolated factors influence their behavior. The researcher only later connects the answers of the different individuals with the variables in the description to isolate the impact of particular factors. This is cognitively less challenging and more natural for the respondents and decreases the risk that respondents consciously bias their answers towards socially desirable responses. It also alleviates the problem that most people are not very insightful about the factors that enter their own decision making process, particularly when factors are highly correlated in the real world. Hence vignette studies are more likely than other survey approaches to elicit stable and true preferences.

Telser and Zweifel (2007) show the external validity of survey experiments by comparing stated choices in their experiment with actual choices made by the same individuals. Several other studies have demonstrated the ability of these kinds of experiments to predict choice behavior. Moreover, results from vignette studies have been shown to be reliable over time (measurements are taken and then repeated at a subsequent point in time), over attribute sets (effect of one set of factors is examined as other factors are varied), and over data collection methods (e.g. Bateson et al., 1987).

Vignette studies exhibit a degree of uniformity and control over the stimulus situation approximating that achieved by researchers using laboratory experimental designs. The researcher achieves this control by providing all the relevant details about the situation and hence standardizing the information that the subjects have at their disposal when making their decisions. An advantage of vignette studies over experiments is that they allow the simultaneous variation of several orthogonal factors of interest rather than merely one or two. Confounding factors are not a problem in principle because vignettes are randomly constructed and randomly assigned to a large number of subjects. This ensures that the causal factors are on average uncorrelated, which allows

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7 Also see Bertrand and Mullainathan (2001) on potential shortcomings of survey data.
the clean econometric estimation of effects. Vignette designs share with field experiments that the subject pool of interest (rather than university undergraduates) is studied in realistic everyday workplace scenarios.\footnote{In our case, the vignette technique avoids problems with studying awards in the lab or in the field. In the lab, one challenge is the creation of meaningful relationships under the current experimental code of anonymity. In the field, effects are hard to quantify since awards are typically used to reward people for tasks that are vague and for work inputs such as motivation and ethics. Hence, the very factors that determine whether awards are used render an empirical investigation difficult.}

3.3. Theory and operationalization of reward treatments

Each vignette describes the introduction of a new incentive for all employees at the IBM research lab in Rüschlikon. All vignettes have identical textual descriptions; they only differ in terms of the realized factor levels in each of the five different vignette dimensions. This means that each subject is randomly assigned an award with a particular set of factor levels, and the assignment procedure is precisely analogous to assigning experimental subjects to different treatment combinations in an experimental study. Building on the literature discussed above, we chose to vary five factors according to what seemed vital for the effectiveness of a reward. The appendix contains the wording of the five factors as well as information on how the factors were operationalized in the statistical analysis.

Factor 1, framing of the incentive. Standard theory suggests that awards only work via reputation formation and the monetary compensation associated with the award. The social recognition associated with the reward should not matter per se. However, a growing body of literature in economics asserts that a preference for social recognition shapes human decisions and that people are willing to incur costs to obtain it (see e.g. Offer, 1997 and Huberman et al., 2004). Hence awards, which include signaling and monetary value as well as social recognition, should have a greater motivational impact than signaling and monetary value alone.

To study whether rewards have a motivational impact associated with social recognition, we described the incentive either as a purely monetary bonus or as an award in the vignettes. The difference is that the former is almost completely devoid of the social component. In the description of the bonus, the management decides who will receive the bonus. Employees do not participate in the nomination process. The money is subsequently transferred to the selected employees’ bank accounts. The
winners are neither congratulated nor celebrated in a public ceremony. If the incentive is framed as an award, the employees participate in the nomination process and the manager personally congratulates the winner(s).

**Factor 2, type of accompanying reward.** According to standard economic theory compensation should always be in cash, as it is the most efficient means of compensation due to its fungibility and option value (e.g. Waldfogel, 1993, 1996). A gift of the same monetary value can never lead to a higher utility than the equivalent payment in cash. Hence, gifts are worse as incentives. However, motivational crowding and signaling theory argue that gifts can lead to a higher motivation because gifts are less likely to be perceived as controlling or as destroying the signaling value of certain actions (e.g. Frey, 1997, Frey and Jegen, 2001, or Bénabou and Tirole, 2004). Charitable contributions, for instance, are often compensated with a small gift rather than a payment in cash. Social and cognitive psychology describe further advantages of gifts that may be sufficient to reduce or eliminate any inherent advantage of cash as an incentive (Jeffrey, forthcoming, and Jeffrey and Shaffer, forthcoming). Participants may perceive non-monetary incentives as more valuable than the retail value of that award in cash. Further, gifts in the form of highly appreciated luxuries can work better than cash in cases in which the employee would feel guilty about purchasing these luxuries herself.

To shed light into this theoretical discord about whether cash or gifts of equal monetary value are better motivators, we used cash as well as gifts as prizes associated with receiving the reward. In case the reward was presented as an award, a random draw decided whether it was described as being accompanied by a cash payment or a gift. In case the reward was framed as a monetary bonus it always came with cash.

**Factor 3, degree of publicity.** In addition to the motivational power of the prospect of winning the incentive per se, rewards can function as signals, bring social recognition by an extended set of colleagues, and cause changes in relative standing. However, for these mechanisms to have motivational power a certain degree of publicity is required; others need to know about the good performance. Both standard economic theory as well as theories assuming a preference for social recognition predict that the motivational impact of a particular award should be higher when the winners are publicly announced than when they are not.
To measure the behavioral impact of visibility, each vignette contained one of the following three types of publicity. First, the list of recipients remains undisclosed. Second, the list of recipients is published on the worldwide intranet for all other employees to see. Third, in addition to publicizing the list of recipients on the intranet, the company arranges a formal ceremony in which the award is handed to the recipients. As with all vignette dimensions, the type of publicity was randomly selected for each vignette. In case the incentive is framed as a monetary bonus, the third possibility involving a formal ceremony was excluded because the employees at IBM would have considered handing out a paycheck publicly unrealistic.

**Factor 4, amount of cash/value of gift.** Standard economic theory suggests that induced motivation should increase with the value of the incentive. The accompanying cash payment or gift of the rewards described in the vignettes varied in value between CHF 0 and CHF 10’000.\(^\text{10}\) In line with standard economic theory, we hypothesize that motivation increases with the value of the reward.

**Factor 5, the maximum number of recipients.** Awards only work as incentives if the prospective recipients value them. The perceived (positional) value of an award depends critically on the award being scarce (e.g. Hirsch, 1976). This is a major difference between awards and money. The value of money per se is not decreased by the fact that other employees also receive a salary.\(^\text{11}\) Hence, the effect of awards should be lower the greater the number of recipients. However, there is a countervailing effect in that an increase in the number of reward recipients, ceteris paribus, increases the chances an individual employee will be a winner. Hence, we hypothesize an inverted u-shaped relationship between the number of recipients and motivation. As long as the quality of the award is not diluted by too high a number of recipients, additional recipients increase effort by raising perceived chances of winning the award. Beyond a certain threshold number of recipients, the negative effect of a decrease in reward

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\(^\text{10}\) The set of possible values was CHF 0, CHF 50, CHF 150, CHF 300, CHF 1’000, CHF 2’000, CHF 4’000, CHF 6’000, CHF 8’000, and CHF 10’000. The equivalent Dollar amounts are approximately equal to $ 0, $ 40, $ 130, $ 250, $ 840, $ 1’680, $ 3’360, $ 5’000, $ 6’700, $ 8’400.

In the statistical analysis, monetary value was treated as a continuous variable. Hence, the number of observations necessary to reliably estimate the effect can be substantially lower than when the variable is categorical.

\(^\text{11}\) For both awards and salaries it is true that recipients might gain utility from having more awards/ a higher salary than their colleagues. However, this social comparison effect (relative income effect) is different from the inflation effect discussed above.
quality outweighs the positive effect of an increase in chances to win. The same prediction follows from the tournament literature, which shows that maximal incentives occur for intermediate promotion rates, and lower incentives occur for lower and higher promotion rates (Gibbs, 2001).

To study the impact of additional recipients on motivation, the maximum number of award recipients per year varied between 1, 2, 6, 10, 16, and 20 in the reward descriptions.12

Table 1 gives an overview of the factors and their levels. Further details are provided in the appendix.

TABLE 1 ABOUT HERE

3.4. A vignette example

After specifying the relevant factors and possible factor levels for the rewards, particular vignettes can be constructed by choosing and combining one factor level from each of the independent factors.13 Here we show a specific vignette example with realized factor levels in bold. For clarity factors and their levels are shown in parentheses; subjects did not see this information. The introductory text that was displayed in front of each vignette as well as one other example are presented in the appendix.

Example:

IBM introduces a new Cooperation Award. Nominations must originate within the team and be supported by the project leader/manager. One level of management in the home office needs to approve the award for the nominated person (factor: framing of the incentive; level: award).

12 Like the monetary value of the reward, the number of recipients is treated as a continuous variable in the statistical analysis.
13 Vignettes were sampled without replacement from the pool of all possible vignettes for a given subject. It is not important that all possible vignettes are actually answered as long as the levels of the different factors are uncorrelated and there is sufficient variation in the vignettes drawn. In the sample of vignettes drawn in our study both of these conditions are met.

While the assignment of vignettes to individual respondents was random, we ensured that the 4 award descriptions each subject was confronted with differed in terms of factor levels (e.g. we ensured that each person received one award with zero, small, medium, and high monetary value). Further, each person received at least one bonus, one award with a cash payment, and one award with a gift. This was necessary to ensure that subjects were not confused by the potential close similarity of award realizations caused by a purely random assignment. Further, we randomized the order in which the different factors appeared in the award description to control for order effects (only the type of reward - bonus or award - always remained at the beginning of the vignette).
In recognition of the recipients’ contribution, the award comes with a ballpoint pen labeled “Thank you for your exceptional contribution!” (factor: type of accompanying reward; level: gift; factor: value of gift; factor level: CHF 0).

There will be **up to 16 recipients** (about 6% of researchers and non-technical staff) per year in the Rüschlikon lab (factor: maximum number of recipients; factor level: 16).

The lab director congratulates the winner(s) in the presence of the other members of the lab at the kick-off meeting in January 2008. Award recipients are published on the intranet (factor: degree of publicity; factor level: ceremony and publication on the intranet).

### 3.5. Operationalization of the dependent variable

Following the scenarios describing the introduction of a new reward, the subjects were asked to indicate their behavior in a public good situation: their willingness to share an important finding with their team before publishing it under their own name. Individuals were told that sharing the finding now would increase the quality and speed of the team project, but expose them to the personal risk that the finding could be used and published without giving them the appropriate personal credit for the discovery. Alternatively, they could wait and publish the finding in a scientific journal under their own name before sharing it with team colleagues. Respondents marked their willingness on a 10-point scale ranging from 1="I definitely would not share now." to 10="I would certainly share now." Employees were familiar with this type of public good situation in their everyday work life, as was confirmed in interviews preceding the study. In the survey, about 84% of the respondents rated the situation description as realistic or very realistic. The appendix contains the wording of the situation description and the questions asked.

### 3.6. Study design

First, we asked the respondents to state their willingness to share the finding assuming they were working in their current work environment (status quo). This provides the baseline motivation of each respondent. Then subjects were confronted with the vignettes, i.e. the scenarios describing the introduction of a reward, and asked to indicate their willingness to share the finding in each of them. As described above, the rewards were granted for extraordinary efforts with respect to cooperation on international teams. Hence, the behavior we ask about in the public good situation is relevant for winning the award. To control for effects specific to the individual using a random effects model, multiple observations per person were generated by presenting
each subject with four different vignettes (reward introduction scenarios). These four reward descriptions present a random set out of the total pool of over 100 different reward descriptions. The total pool was comprised of all possible combinations of values in the five dimensions that characterize each reward. Hence, the descriptions of rewards 1, 2, 3, and 4 were different for each respondent. After having stated their motivation in the public good situation in the fourth award vignette, we described a scenario in which the individual either did or did not receive the reward that was described to them as reward 4. We then asked them again to indicate how willing they would be to share the finding now that they know whether they received reward 4 or not. Because this question was asked only once, we have only one observation of the motivation after revealing the recipients per respondent (rather than four in the case of motivation after incentive announcement). However, we can still draw general conclusions, as the fourth and final reward descriptions were representative of all incentive descriptions because they were randomly chosen for each respondent from the set of all possible vignettes. The questionnaire ended with a survey section in which respondents were asked questions about their perception of the role of awards in organizations and the determinants of award effectiveness in motivating employees. Further, we asked about personal characteristics such as gender, age, and award history at IBM. The questions in the survey section were the same for all participants.

The respondents progressed through the questionnaire in the following fashion: Vignettes 1 to 4 were different for each subject.

1. Each subject is asked about their behavior in the baseline public good situation.

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14 Reasons for inquiring about motivation after revealing the recipients only once and after the last vignette are the following: 1) Answers to the different incentive descriptions may otherwise have been biased by whether the person had or had not received the previous reward; 2) Studying the effect of receiving versus not receiving an award is a delicate issue in surveys since it heavily relies on subjects’ willingness to imagine their emotional reaction. In general, people are not willing to do this often; 3) Subjects had to state their willingness to share the finding 5 times prior to this question (with respect to their current work environment and after each of the four incentive introduction scenarios). Adding the scenario on winning or not winning the award as well as the associated questions after each reward introduction scenario would have made the questionnaire overly long and repetitive.

15 To ensure that subjects did not use the first award description as their baseline/reference point and evaluated awards 2 – 4 in comparison to the first award scenario, we informed the subjects in advance what kinds of different incentives they could expect; for instance, that the rewards would come with or without a monetary bonus ranging in value from CHF 50 to CHF 10’000. This was necessary to make the answers comparable across subjects, since the realized values and therefore the description of reward 1 was different for each subject.
2. Each subject is presented with her particular realization of vignette 1 and then asked about her behavior in the public good situation.

3. Each subject is presented with her particular realization of vignette 2 and then asked about her behavior in the public good situation.

4. Each subject is presented with her particular realization of vignette 3 and then asked about her behavior in the public good situation.

5. Each subject is presented with her particular realization of vignette 4 and then asked about her behavior in the public good situation.

6. Each subject learns whether she receives the reward described in vignette 4 and then asked about her behavior in the public good situation.

7. Each subject is asked a number of survey questions regarding her personal characteristics, her thoughts on the determinants of award success, and her ideas about how awards function in organizations.

3.7. Implementation

The vignette study was conducted in a two-week period in January/February, 2007, with the employees of the IBM research lab in Rüschlikon, Switzerland. The facility has 255 employees, 177 of which are researchers from more than 20 countries (primarily European). The lab in Rüschlikon is one of eight research labs that IBM maintains worldwide with about 3’550 employees total. In collaboration with clients and universities, researchers at these labs conduct basic as well as applied research in chemistry, information technology, physics, electrical engineering, and materials science among others. To date, four researchers\(^\text{16}\) have been awarded Nobel prizes in physics for research conducted during their time as employees at the IBM lab in Rüschlikon. The management in Rüschlikon hands out the approximately 20 different awards that are available in all IBM research labs. The awards are broadly separated into formal and informal awards. Formal awards recognize outstanding scientific contributions and innovations and are associated with substantial monetary compensations. Recipients of these awards are always announced on the worldwide intranet of IBM research and have the possibility to move up an award ladder culminating in admission to the IBM academy (about 500 people worldwide) or nomination as an IBM Fellow (about 40 people worldwide). Informal awards honor exceptional motivation in general; examples are contributions to teams, knowledge sharing, passion for work, and customer service. According to the human resource

\(^{16}\) These are Gerd Binnig and Heinrich Rohrer who were awarded the Nobel Prize for Physics in 1986 for the invention of the scanning tunneling microscope. In 1987, Georg Bednorz and Alex Müller received the same honor for the discovery of high-temperature superconductivity.
manager, informal awards are also used to motivate researchers in times in which no major scientific breakthrough is imminent. Informal awards are typically associated with smaller monetary bonuses or gifts such as dinners or weekend trips. Only the more important informal awards are publicized on the local intranet of the Rüschlikon lab. Given the large number of established awards, respondents can be assumed to be familiar with their own behavior and feelings with respect to striving for and receiving awards. This is an advantage for the study, since it increases reliability and the predictive power of our findings. However, it proved challenging to design a new and meaningful award and to find an associated behavior that was not already covered by one of the established awards.

During the survey period, 52 researchers completed the questionnaire, resulting in a response rate of 30%. The respondents are representative of the workforce with respect to all objective criteria available from the company.\textsuperscript{17}

4. Results

This section presents the results of the impact of variation in award factors on behavior. Further, we study the reaction of winners and losers after announcing the recipients of the reward and discuss predictions for the change in behavior that can be expected if IBM introduces an award for international cooperation.

4.1. Awards as incentives

We analyze the data with random effect models (see Greene, 1997, p. 623ff). Like fixed effects models, random effect models control for unobservable individual specific effects but allow for the inclusion of time-invariant independent variables. The random effect for each individual captures the individual specific propensity to respond to incentive introductions irrespective of the realized award factor levels. This propensity is potentially independent of the baseline motivation that we control for separately. Random effect models require that the unobserved individual effect is uncorrelated with all explanatory variables for all observations of that individual. Since the explanatory variables, i.e. the treatments, were randomly assigned to the individual there should be no such correlation. However, our results are robust with respect to

\textsuperscript{17} Among the workforce of the IBM lab in Rüschlikon average age, proportion of females, and length of employment are 41 years, 13.2\%, and 12 years. The respective numbers are 42 years, 10\%, and 12 years among our sample of respondents.
other estimation techniques like ordered probit, fixed-effect models, and OLS-regressions that do not include random effects.\textsuperscript{18} Table A in the appendix presents the results of the different models. The main regression includes five predictor variables associated with the five factors that were varied to produce specific vignettes. We also included a predictor variable to control for variation in baseline motivation among subjects. Model 1 in table 2 shows the results.

TABLE 2 ABOUT HERE

The monetary value of the reward has a robust and statistically significantly positive impact on contributions, i.e. the willingness to share the sensitive finding with colleagues. We use the log of monetary value to account for potential non-linearities like those associated with marginal effects that decrease in the value of the reward.\textsuperscript{19} The coefficient of 0.07 implies that an increase in the value of the award from CHF 0 to CHF 150 increases the stated contributions by 0.34 on a 10-point scale. An increase from CHF 0 to CHF 2'000 increases it by 0.52, an increase from CHF 0 to CHF 8'000 increases the stated willingness by 0.62 points. Model 2 of table 2 presents the regression results when dummies are used to represent reward value categories. It turns out that zero and small monetary values do not have a statistically significantly different impact on contributions. Also, contributions for medium and high reward values are not statistically different. Compared to the latter, zero or small monetary values lead to a motivation that is approximately half a point lower on a 10-point scale. This difference is statistically significant. When designing awards, managers should, hence, consider that employees care about whether the award comes with a substantial

\textsuperscript{18} Since respondents indicated their answer on a 10-point scale (1: "I definitely would not share now." to 10="I would certainly share now."), one could argue for the use of ordered probit models. However, studies have shown that 10-point scales can be interpreted as continuous (e.g. van Praag, 1991, Ferrer-i-Carbonell and Frijters, 2004 on reported life satisfaction, or Moffit, 1999, on linear probability models). Further, one might advocate the use of fixed effects models and only study within person variation. This is preferable when the unobserved individual effect $a_i$ is correlated with any explanatory variable. However, there should be no such correlation in our design. An OLS-model with neither fixed nor random effects, controlling for baseline motivation only, might be suitable when the individuals are not heterogeneous in their reaction to the introduction of an incentive per se (irrespective of reward characteristics). However, a priori this assumption is not necessarily fulfilled.

\textsuperscript{19} To construct the variable $ln(Value)$, $(Value+1)$ is used, since $Value$ can be equal to CHF 0. We assume that observed behavior for CHF 0 is not markedly different from what one would observe for CHF 1. Including a dummy for every possible monetary value, which is the most flexible functional form, confirms that the logarithmic specification is appropriate.
amount of money or not. Differences in motivation induced by increases in the monetary amount beyond CHF 2’000 lead to only negligible increases in motivation. In addition, different monetary components between CHF 0 and CHF 300 do not result in different motivation levels among employees. In the qualitative survey conducted after the vignette study, the responding employees confirmed the importance of the monetary value of rewards. Almost all indicated that they considered it to be essential for an award to be accompanied by a substantial monetary bonus. This can be interpreted in two ways: First, the money that comes with the award and not the award per se motivates employees. Or second, it is the award per se that motivates employees, but the appreciation of an award depends on whether or not the award is costly for the employer: Only awards that involve real costs for the employer ensure that the award is meant seriously and is not merely used as a cheap incentive device.

Publicity in the form of an announcement of the winners on the intranet in combination with a ceremony has a statistically significantly positive effect on stated contributions to the public good. As compared to a situation with no publicity, contributions are on average 0.44 points higher, which is substantial. Naming the recipients and having a ceremony increases contributions by as much as increasing the value of the award from CHF 0 to about CHF 1’000. The finding that publicity is important is in line with answers from the survey part of the study. Almost all respondents agreed that awards are important as signals of one’s qualities to other employees and outsiders, which requires a certain degree of publicity. Employees further stated that they consider it important that awards are made public either in the form of certificates to be put on the wall, a ceremony, and/or publication on the intranet. The coefficient of having a ceremony and announcing the winners on the intranet is substantially larger than the coefficient of an announcement on the intranet alone. For the rewards to serve as signals only the announcement is necessary. Hence, the larger coefficient on the combination of intranet and ceremony indicates that employees value the ceremony per se. This is hard to reconcile with standard theory that argues that ceremonies should work only to the extent that the associated publicity signals one’s success.

For a given monetary value, gifts works less well than payments in cash, which is in line with standard theory. Holding the value of the reward constant, a gift leads to a willingness that is 0.33 points lower than the willingness induced by an equivalent payment in cash. The size of this effect is substantial. For a gift to induce the same
willingness to share as a payment in cash of CHF 50, it needs to increase in value from CHF 50 to CHF 2’000. Again, this is in line with remarks by the respondents. In the comment section, a substantial number stated that they preferred money or paid vacation to other kinds of prizes.

We do not find a statistically significant effect of the framing of the incentive. Hence presenting the reward as a purely monetary bonus that will be transferred anonymously to the winners’ bank accounts has the same effect as presenting it as an award that is handed over by the superior with congratulations. This insignificance might be due to the fact that bonuses in our design were very similar to awards despite the fact that only the latter were associated with social recognition. Since each reward description presents a combination of levels for all factors, bonus scenarios also contain a maximum number of recipients and in half of the cases an announcement of the recipients on the intranet. This might have rendered the bonus descriptions too similar to established IBM awards for us to find a statistically significant effect.

The number of recipients also does not have a statistically significant effect. The two hypothesized countervailing effects might cause this insignificance: an increase in the number of recipients reduces the scarcity value of the award but raises the perceived chances of winning. Including the square term of number of recipients to account for the potential non-linearity does not change the result. While all other coefficients remain virtually unchanged, neither the coefficient of number of recipients nor the coefficient for the squared term are statistically significant. However, the two coefficients have opposing signs, indicating that two countervailing effects might be at work.

The baseline motivation has a highly statistically significant positive effect on the willingness to share the finding. The respective coefficient implies that a person with a 1-point higher willingness to share the finding in the current work environment is about 0.9-points more willing to share the finding after incentives have been introduced. Hence, subjects that differ in their baseline motivation do not markedly differ in their reaction to the introduction of an incentive.

Demographic variables such as age, gender, and experience with international teams do not play a role. We also checked whether the award history of the participants, i.e. the number and value of the IBM awards received in the past, was an important
determinant for their stated sharing behavior. All of these variables are statistically insignificant and the Akaike information criterion (AIC)\(^{20}\) indicates that adding them to the models discussed above does not increase the informational content enough to justify their inclusion. Hence, these variables are left out of the models reported. At the same time, our results are robust to the incorporation of these variables. We also checked whether the effect of one reward factor depends on the presence or absence of other factors. The number of recipients or the type of reward could, for instance, potentially interact with the monetary value of the reward. However, no interaction effects are statistically significant, and AIC\(_c\) suggests that they should not be included in the regression models.

To sum up, our data show that rewards have significant and systematic effects on stated contributions of employees in a public good situation that they were well familiar with in their work experience. The results are in line with standard theory in that 1) contributions strictly increase with the monetary value of the reward and a value of zero leads to no increase in contribution; 2) Gifts are valued less than the cash equivalent; 3) Framing the reward as an award, which can be associated with monetary or non-monetary compensation, or framing it as a strictly monetary incentive does not play a role; 4) Publicity in the form of announcing the winners and having a ceremony matters, which is in line with standard theory in so far as the publicity can possibly be transformed into higher subsequent monetary compensation at a later point. This is clearly the case for announcing the winners on the worldwide intranet, which increases reputation, opens up opportunities for future collaborations, and serves as a signal for ability. However, the substantial impact of ceremonies on behavior is much more difficult to reconcile with standard theory because ceremonies typically take place in the presence of co-workers that are well aware of the recipients’ abilities. Hence, it seems that ceremonies motivate subjects via the provision of social recognition in a way that goes beyond what can be rationalized by standard theory.

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\(^{20}\) Akaike’s information criterion (AIC) is an index used in a number of areas as an aid to choosing between competing models. The index takes into account both the statistical goodness of fit and the number of parameters that have to be estimated to achieve this particular degree of fit by imposing a penalty for increasing the number of parameters. AIC\(_c\) is AIC with a second order correction for small sample sizes (Everitt, 1998).
4.2. The effect of receiving and not receiving the reward

Our design also allows us to study how people react when they receive or do not receive the reward. This is central in predicting the overall impact of awards. Neither economic nor psychological theories allow for a clear behavioral prediction. While economic status models (e.g. Auriol and Renault, 2004) and some psychological literature (e.g. Ambrose and Kulik, 1999) posit a positive effect on effort of receiving and a negative effect of not receiving the award on effort, incentive considerations suggest that winners should be less motivated by the prospect of winning the award a second or third time. Additionally, observing the recipients and their behavior can influence non-recipients by providing new information on the type and level of effort required to win the reward.

After having stated their contribution to the public good when vignette four was first presented, we then told each respondent whether she received the presented reward. Then we asked each respondent again to indicate how willing she was to share the finding now that she knew whether she was a winner or a loser of reward 4. Model 1 in table 3 presents the results of the basic regression in which the willingness to share the finding after revealing the winners is the dependent variable and whether the person receives the reward or not is the main independent variable. In addition to the reward factors, we control for baseline motivation and the incentive effect of the award, i.e. the motivation stated after incentive 4 was announced but not yet handed out (this variable is called Sharing4 in table 3).

TABLE 3 ABOUT HERE

The motivation of winners is statistically significantly higher than the motivation of losers. The difference in contribution is 0.71 on a 10-point scale. Persons with a higher baseline motivation and those with a higher willingness to share the finding after reward 4 was introduced are more willing to share the finding after announcing the winners independently of whether they receive the reward or not. The award factors do not have a statistically significant effect on the motivation after announcing the winners other than via the contribution stated after the introduction, but prior to conferral of reward 4, marked as Sharing4 in the table 3. The previous analysis showed that Sharing4 is influenced by the award factors. To check whether award factors or the size of motivation prior to revealing the recipients have different effects on winners
and losers, we include interaction effects of all award factors and whether the reward was received or not. The results, which are displayed in model 2 of table 3, indicate that the award factors do not have statistically significantly different effects on winners and losers. The only exception is the weakly significant interaction effect between announcing the winners on the intranet and winning the award.

In a separate calculation we subtracted the motivation after revealing the winners from the motivation upon announcement but before conferral of reward 4 for each respondent. This shows that losers on average decrease their motivation by 0.4, while winners increase it by approximately the same amount. The effect on the non-recipients is negative at the 90% confidence level, while the effect on the recipients is positive at the 95% confidence level. Hence, winners do indeed increase their motivation upon receipt. In contrast, losers experience a decrease in motivation, which could be due to disappointment or information updating. The magnitude of the effects of winning and losing are substantial. Hence, at the aggregate level it is not enough to assess the effects of awards upon announcement in order to determine the profitability of an award.

4.3. Four examples of changes in stated contributions induced by awards

This section illustrates the magnitude of the change in behavior induced by installing the discussed award for international cooperation at IBM, Switzerland. While these predictions illustrate the change in behavior that can be expected, they provide no new information on the relative effectiveness of the different award factors as discussed above. The predicted change in behavior is calculated for four example awards (combinations of different award factor levels).

Examples 1 & 2: Awards that correspond to what is known as *formal awards* at IBM: *Formal awards* typically come with a substantial bonus in cash (here we use CHF 8'000), are publicized on the intranet, and have approximately 4 recipients per year out of the total of 177 researchers at IBM, Switzerland (example 1). Example 2 is identical to the award in example 1 but adds an award ceremony to the announcement of the winners on the intranet.

Examples 3 & 4: Awards that correspond to what is known as *informal awards* at IBM: *Informal awards* typically have 9 recipients a year and come in one of two different forms. They are worth about CHF 2'000 in cash and are publicized on the
intranet (example 3), or they are of smaller value (e.g. CHF 150), come in the form of a gift, and are not publicized (example 4).

The prediction of the contribution upon award announcement are based on the estimated coefficients as presented in model 1 of table 2 using the factor levels as presented in the example award descriptions and the average baseline motivation of 7.39. The expected motivation when revealing the recipients is based on regression model 1 as shown in table 3 where the predicted point estimate for the motivation upon award announcement is used as an independent variable in addition to the factor levels of the example awards and the average baseline motivation.\(^\text{21}\) Calculating the predicted contributions both upon award announcement and conferral allows one to make a rough estimate of the overall impact of installing and distributing an award for international cooperation. Table 4 provides an overview of the estimated contributions after announcement and conferral for each of the four example awards.

**TABLE 4 ABOUT HERE**

The announcement of an award as described in example 1 increases contributions as compared to the average baseline motivation by 5%. IBM is considering the introduction of award ceremonies. Our results suggest that they should do so. Awards as described in example 2 increase contributions as compared to the average baseline by 7.5%. The 95% prediction intervals for examples 1 and 2 are [-2%, +12%] and [1%, 14%] respectively. Example award 3 leads to an expected change in average motivation of 4%, while an example award 4 most likely decreases contributions by 6%. The 95% prediction intervals for these two examples are [-2%, +10%] for example 3 and [-11%, -1%] for example 4.

These predictions suggest that the expected increase in motivation due to the announcement of a formal award for international cooperation at IBM might be rather small, while informal awards might substantially decrease motivation. This result is not surprising considering the situation at IBM, which has over 20 established awards. Assuming that the existing awards target those behaviors that are most responsive to awards and that there are decreasing marginal benefits of additional awards, it is unsurprising that the change in behavior induced by an additional award for

\(^{21}\) When interpreting the predicted motivation after the recipients are revealed, one needs to take into account that the point estimate of the motivation upon award announcement is associated with prediction error.
international cooperation is modest. The decrease in motivation caused by the informal award in example 4 can be interpreted in terms of motivational crowding out (e.g. Frey, 1997). In general, one of the prerequisites for motivational crowding out is high intrinsic motivation. In this case, this seems to hold insofar as the researchers indicated in their comments and in the pretest that sharing findings when beneficial for the team is considered a matter of course. Given this high intrinsic motivation, motivational crowding may have occurred because the employees interpreted the award as a signal of distrust by the company with respect to employee loyalty. While the other example awards come with substantial extrinsic incentives in the form of monetary compensation and publicity and might thereby compensate for the reduced intrinsic motivation, this is not the case for example award 4.

Overall, table 4 shows that three out of the four example awards increase motivation upon announcement. After the recipients are revealed, the motivation of winners is higher than the baseline for all example awards, while that of losers is persistently lower. Since the number of non-recipients is large compared to the number of recipients, it is likely that total motivation when the recipients are revealed is lower than the baseline. However, both the joy of receiving an award as well as the disappointment of not receiving it most likely subside with time. At some point the psychological salience of an award granted in the past subsides and the incentive effect of potentially winning the award in the future comes to dominate again. The net motivational effect of announcing and conferring an award will depend on how long this whole process takes, on how many winners and losers there are, and on how the incentive effect changes through time. Thus, while awards of the type presented in example 4 certainly decrease motivation, awards like those in examples 1, 2, and 3 are likely to produce a positive motivational effect if disappointment is short-lived and the incentive effect remains high in the long run.

5. Conclusion

Awards are omnipresent, but have so far escaped the attention of economists. In particular, empirical evidence is lacking. This paper presents a first step in filling this gap. Our findings suggest that awards systematically influence behavior, and should be considered as an additional instrument in principal-agent relationships.
Awards present motivators that combine feedback, information, and social recognition. Our design is novel in that it permits the isolation of the effects of individual award characteristics while not artificially restricting the number of award characteristics present. One further contribution of this study is that our real-world subject pool allows inferences regarding how a workforce might behave in an actual firm when a new award is introduced. However, our predictions regarding behavior both when the award is announced and when the winners are revealed do not permit a final assessment of the profitability of introducing an award. To predict quantitatively the overall change in behavior due to the introduction of an award is difficult, for instance, because aggregating the effects over all employees requires one to estimate the time until the disappointment among losers subsides and the ex ante incentive effect returns. At the same time, it is unclear how the incentive effect changes over time as heterogeneous employees both win and lose multiple awards. The profitability of awards for the company also depends on the impact of the induced changes in behavior on company profit and on the costs of award administration – information that is often hard to determine.

Awards as extrinsic incentives, are found to potentially crowd-out intrinsic motivation. In case extrinsic incentives are employed, as is the case in most for-profit companies, awards will work better than other kinds of performance compensation. Since awards are typically granted for a broad array of different behaviors as well as inputs such as work motivation and ethics, they are typically viewed as less intrusive than monetary compensation that is closely tied to performance. Further, awards do not necessarily destroy the signaling value of exceptional efforts as much as cash does. We plan to address this issue of the relative merits of performance pay and awards in various work and task environments in future research.

Our result nevertheless suggests that awards are a powerful motivational drive. It is, however, necessary to design awards carefully. Specifically, requirements for a good design are that it is adapted to the activity targeted, facilitates a fast reversion of the motivation of losers to the one indicated upon award announcement, and incorporates those award characteristics that the employees deem worthwhile. This is necessary, since the establishment of awards, as is the case for all incentive schemes, is not without risk; badly designed awards may backfire.
For a broader picture, the vignette experiment should be complemented with behavioral data. Further, the results of this vignette experiment should be compared with those generated in companies in other industries and in firms with few or no established awards. This paper is only a starting point for an empirical approach to the phenomenon of awards in economics.
**Literature**


APPENDIX

1. Explanation of the procedure to respondents

We will now present you with four different scenarios:

- Introduction of Incentive 1
- Introduction of Incentive 2
- Introduction of Incentive 3
- Introduction of Incentive 4.

In each scenario, a hypothetical incentive for international cooperation is introduced at IBM Rüschlikon. Every respondent receives a different set of 4 incentives. The 4 incentives are randomly assigned to you. Here is an overview over the range of possible incentives: The incentives are either cash incentives or awards. They are worth between CHF 50 and CHF 10 000. Some of the described awards come with a cash bonus, some with nothing, others with a material gift such as a pen, a voucher for gourmet dinner, or a 4-day vacation (including additional days of paid vacation). In the scenarios, the maximum number of recipients per year varies between 1 and 20. In some scenarios, a list of recipients will be published on the intranet. In some instances there will be a ceremony for the winners.

For each scenario we will ask you the same question:

- What is your willingness to share the finding now?

Please look at these questions as a thought experiment and try to answer them by putting yourself into each scenario.

2. How the vignettes were introduced to respondents

Please imagine the following.

(This description is valid for all 4 incentive descriptions. We will repeat it each time so that you can look at it again if you want to.)

In addition to the existing bonuses and awards, IBM Research announces a new incentive for individuals who have made great efforts to promote cooperation between labs.

Recipients will be selected annually, starting in December 2007.

The incentive is for individuals demonstrating exceptional efforts to promote cooperation on projects involving employees from different research labs and IBM units.

All employees on the IBM payroll are eligible.

Criteria for selection are:

- Initiation and maintenance of successful collaborations among research labs.
- Exceptional dedication to making teamwork succeed across national boundaries.
- The sharing of ideas and knowledge among labs.
3. One example of a vignette

IBM introduces a monetary incentive for international cooperation. Your performance with respect to international cooperation will be evaluated qualitatively and quantitatively as part of your annual performance evaluation. The management will then decide who the recipients are. If you are selected, the associated payment will be included in your December salary.

There will be up to 6 recipients (about 2% of researchers and non-technical staff) per year in the Rüschlikon lab.

The incentive is worth CHF 4 000 in cash.

Who receives an incentive will not be publicly announced.

4. How the willingness to share the finding was elicited from the respondents

Situation Description: Please imagine the following:

• You are assigned to an international project that involves several research laboratories.

• Apart from you, there are two employees from Beijing and two from New York on the team.

• You have never worked with the employees from the other labs on a team before. On this team, management does not intervene much in the project.

• You have made an important finding on this team.

• This finding can be used to greatly enhance the international project you are working on at the moment.

• However, the finding is fundamental in the sense that it is very relevant to a variety of other projects as well.

Now you have two options.

• First, you can share this finding now with your team colleagues before publishing it under your own name.

  This would solve some important problems on the project and greatly enhance the quality and speed of the project.

• Second, you can wait and share the finding later, after it has been published.

  This would eliminate the risk that it could be used by your Chinese or U.S. colleagues in their own work without giving you the appropriate credit for your work, both within the company and when writing papers. You don’t think that this is very likely, but the risk exists.

Please indicate how realistic you consider the described situation.

6: very realistic … 1: very unrealistic; no answer

On a scale between 1 and 10, what is your willingness to share the finding now?
(Sharing the finding now means choosing the first option.)

10: I would certainly share now. … 1: I definitely would not share now; no answer.

5. **Wording of the levels of the reward characteristics**

A particular vignette is constructed by randomly selecting one factor level for each of the five factors. In the following, we present the five different factors, their levels, the corresponding texts in the vignettes, and the operationalization of the factors in the statistical analysis.

**Factor 1, framing of the incentive.**

**Factor 1, level a, monetary incentive.**

“IBM introduces a monetary incentive for international cooperation. Your performance with respect to international cooperation will be evaluated qualitatively and quantitatively as part of your annual performance evaluation. The management will then decide who the recipients are. If you are selected, the associated payment will be included in your December salary.”

**Factor 1, level b, award.**

“IBM introduces a new Cooperation Award. Nominations must originate within the team and be supported by the project leader/manager. One level of management in the home office needs to approve the award for the nominated person.”

In the regression models factor 1 was treated as a dummy variable, *Award*, that took the value 1 if the reward was framed as an award and the value 0 if framed as a monetary incentive.

**Factor 2, the type of accompanying reward.**

The wording of this factor depended on the monetary value of the reward (factor 4) and will be presented in the description of factor 4 below.

**Factor 2, level a, gift.**

**Factor 2, level b, cash payment.**

In the regression models factor 2 was treated as a dummy variable, *Gift*, that took the value 1 if the reward was accompanied by a gift and the value 0 if the reward was accompanied by a payment in cash. In case the reward was framed as a monetary incentive (factor 1, level a), the reward was always accompanied by a cash payment and never by a gift (i.e. factor 2 was always level b).

**Factor 3, the degree of publicity.**

The text for factor 3 differed based on whether the incentive was framed (factor 1) as an award or a monetary incentive. If framed as an award, the three factor levels had the following texts.

**Factor 3, level a, anonymous.**

“The lab director congratulates the winner(s) privately. Award recipients are not published on the intranet.”

**Factor 3, level b, announcement on the intranet.**
“The lab director congratulates the winner(s) privately. Award recipients are published on the intranet.”

**Factor 3, level c, announcement on the intranet and ceremony.**

“The lab director congratulates the winner(s) in the presence of the other members of the lab at the kick-off meeting in January 2008. Award recipients are published on the intranet.”

When the reward was framed as a monetary incentive, factor 3 did not have a factor level c. Factor levels a and b were worded as follows.

**Factor 3, level a, anonymous.**

“Employees receiving the bonus will remain undisclosed.”

**Factor 3, level b, announcement on the intranet.**

“For those interested, a list of recipients will be available for downloading on the intranet by the middle of December, 2007.”

In the regression models the factor levels were represented with 2 dummy variables. The variable Intranet was a dummy that took on the value 1 if the list of recipients was published on the intranet without a ceremony. The variable Ceremony was a dummy that took the value 1 if the recipients were announced on the intranet and the award was handed out in a ceremony. Factor level a was represented by both dummies taking the value 0, factor b was represented as Intranet = 1 and Ceremony = 0, and factor level c was represented as Intranet = 0 and Ceremony = 1.

**Factor 4, monetary value of cash payment or gift associated with the reward.**

To determine the monetary value of the reward we used a two-step sampling procedure. We did this to ensure that we sampled the space of monetary values adequately. Specifically, we first randomly determined whether the reward would have no monetary value, a small monetary value, a medium monetary value, or a high monetary value. Second, if the incentive was framed as a monetary incentive (factor 1, level a), one of three numerical values was selected from the category selected in step one.

**Factor 4, level a, Category 1: Zero monetary value**

**Factor 4, level b, Category 2: Small monetary value (CHF 50, 150, or 300)**

**Factor 4, level c, Category 3: Medium monetary value (CHF 1’000, 2’000, or 4’000)**

**Factor 4, level d, Category 4: High monetary value (CHF 6’000, 8’000, or 10’000)**

In the regression models the variable Value was treated as quantitative and took one of the following values: 0, 50, 150, 300, 1’000, 2’000, 4’000, 6’000, 8’000, 10’000.

The wording of factor 4 depended on the framing of the incentive (factor 1) and the type of accompanying reward (factor 2). When the reward was framed as a monetary incentive (factor 1, level a), it was always accompanied by a payment in cash and never by a gift. When the reward was framed as an award (factor 1, level b), a random draw decided whether it was accompanied by a payment in cash or by a gift. Since the values of gifts are typically vague, our set of possible gifts had four elements, namely one gift for every category described above. Importantly, the set of possible gifts did not include one gift for each of the possible monetary values listed above. Depending
on the category of monetary value drawn, a gift of corresponding value was described to the participants. The associated monetary value used in the statistical analysis was equal to the intermediate amount in the category. For example, if the gift was of medium value, the value used in the statistical analysis was CHF 2’000. In case the reward came with a payment in cash, a random draw decided which of the values in each category was displayed to the participant.

The texts associated with the different levels of factor 4 are displayed below. As discussed, this text depended on the framing of the incentive (factor 1) and the type of accompanying reward (factor 2).

**Factor 4, level a, Category 1: Zero monetary value**

- Factor 1, level a and factor 2, level b: monetary incentive.
  - This option was excluded, since a bonus of zero value is meaningless.
- Factor 1, level b and factor 2, level b, award with cash payment.
  - “The award is not accompanied by a payment in cash.”
- Factor 1, level b and factor 2, level a, award with gift:
  - “In recognition of the recipients’ contribution, the award comes with a ballpoint pen labeled ‘Thank you for your exceptional contribution!’ ”.
  
  The value of this gift used in the regression was CHF 0.

**Factor 4, level b, Category 2: Small monetary value (CHF 50, 150, or 300)**

- Factor 1, level a and factor 2, level b: monetary incentive.
  - “The incentive is worth CHF Y in cash.”, where Y is randomly chosen from \{50, 150, 300\}.
- Factor 1, level b and factor 2, level b, award with cash payment.
  - “The award comes with CHF Y in cash.”, where Y is randomly chosen from \{50, 150, 300\}.
- Factor 1, level b and Factor 2, level a, award with gift:
  - “In recognition of the recipients’ contribution, the award comes with a gift basket including a good bottle of champagne, two bottles of wine, and various specialty food items.”
  
  The value of this gift used in the regression was CHF 150.

**Factor 4, level c, Category 3: Medium monetary value (CHF 1000, 2000, or 4000)**

- Factor 1, level a and factor 2, level b: monetary incentive.
  - “The incentive is worth CHF Y in cash.”, where Y is randomly chosen from \{1’000, 2’000, 4’000\}.
- Factor 1, level b and factor 2, level b, award with cash payment.
  - “The award comes with CHF Y in cash.”, where Y is randomly chosen from \{1’000, 2’000, 4’000\}.
- Factor 1, level b and factor 2, level a, award with gift:
“In recognition of the recipients’ contribution, the award comes with an additional day of paid vacation and a voucher for a gourmet menu for four people at the Restaurant Petermann’s Kunststuben in Küsnacht, where the star cook Horst Petermann will personally cater the party.”

The value of this gift used in the regression was CHF 2’000

**Factor 4, level d, Category 4: High monetary value (CHF 6000, 8000, or 10’000)**

Factor 1, level a and factor 2, level b: monetary incentive.

”The incentive is worth CHF Y in cash.”, where Y is randomly chosen from \{6’000, 8’000, 10’000\}.

Factor 1, level b and factor 2, level b, award with cash payment.

”The award comes with CHF Y in cash.”, where Y is randomly chosen from \{6’000, 8’000, 10’000\}.

Factor 1, level b and factor 2, level a, award with gift:

“As a symbol of recognition, the award comes with a voucher for a trip of 4 days for two adults and children to a destination of their choice, all-inclusive. This trip will not be deducted from your normal paid vacation and thus presents additional paid vacation days.”

The value of this gift used in the regression was CHF 8’000. The value of the gift is based on the fact that IBM estimates that one workday for one employee is worth about CHF 1’000.

**Factor 5, the maximum number of recipients per year.**

“There will be up to X recipients (Z% of researchers and non-technical staff) per year in the Rüschlikon office.”, where X and Z are chosen from the set \{(1, 0.4%), (2, 1%), (6, 2%), (10, 4%), (16, 6%), (20, 8%)\}.

In the regression models, factor 5 was treated as a quantitative variable, \#Recipients, with values 1, 2, 6, 10, 16, and 20.
6. Tables

Table A: Comparison of Different Estimation Techniques:

<table>
<thead>
<tr>
<th>Dependent variable.</th>
<th>Random Effects</th>
<th>Fixed Effects</th>
<th>Random Effects</th>
<th>Clustered OLS</th>
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<td>Willingness to share the finding</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln(Value)</td>
<td>0.07**</td>
<td>0.07**</td>
<td>0.12**</td>
<td>0.06(*)</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td></td>
<td>0.26</td>
<td>0.31</td>
<td>0.26(*)</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>(0.18)</td>
<td>(0.19)</td>
<td>(0.26)</td>
<td>(0.28)</td>
</tr>
<tr>
<td>Intranet</td>
<td>0.44*</td>
<td>0.42(*)</td>
<td>0.61*</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>(0.21)</td>
<td>(0.22)</td>
<td>(0.30)</td>
<td>(0.33)</td>
</tr>
<tr>
<td></td>
<td>-0.33(*)</td>
<td>-0.33(*)</td>
<td>-0.47(*)</td>
<td>-0.31</td>
</tr>
<tr>
<td></td>
<td>(0.17)</td>
<td>(0.17)</td>
<td>(0.26)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>Ceremony</td>
<td>-0.04</td>
<td>-0.01</td>
<td>-0.02</td>
<td>-0.15</td>
</tr>
<tr>
<td></td>
<td>(0.20)</td>
<td>(0.21)</td>
<td>(0.28)</td>
<td>(0.22)</td>
</tr>
<tr>
<td></td>
<td>0.01</td>
<td>0.01</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Gift</td>
<td>0.90**</td>
<td>1.23**</td>
<td>0.90**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.26)</td>
<td>(0.06)</td>
<td></td>
</tr>
<tr>
<td>#Recipients</td>
<td>0.28</td>
<td>6.83**</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.47)</td>
<td>(0.23)</td>
<td>(0.77)</td>
<td></td>
</tr>
</tbody>
</table>

Observations | 208 | 208 | 208 | 208 |
Individuals | 52 | 52 | 52 | 52 |
R^2 within | 0.12 | 0.12 | | |
R^2 between | 0.85 | 0.00 | | |
R^2 overall | 0.78 | 0.01 | | 0.78 |

Notes: ** statistically significant at 99% level, * significant at 95% level, (*) significant at 90% level.
Standard errors are displayed below coefficients in parentheses.
* Dependent variable rescaled to interval 0 to 9 for use of Ordered Probit estimation.
+ Reference group: Monetary incentive/bonus
### Tables for text

**Table 1: The factors and their levels**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Factor levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framing of the incentive: (categorical)</td>
<td>monetary incentive, award</td>
</tr>
<tr>
<td>Type of accompanying reward: (categorical)</td>
<td>gift, cash payment</td>
</tr>
<tr>
<td>Degree of publicity: (categorical)</td>
<td>anonymous, intranet announcement, intranet with ceremony</td>
</tr>
<tr>
<td>Monetary value of cash payment or gift: (continuous)</td>
<td>zero¹, small², medium³, high⁴</td>
</tr>
<tr>
<td>Maximum number of recipients: (continuous)</td>
<td>1, 2, 6, 10, 16, 20</td>
</tr>
</tbody>
</table>

*Notes:¹ {CHF 0}; ² {CHF 50, 150, 300}; ³ {CHF 1'000, 2'000, 4'000}; ⁴ {CHF 6'000, 8'000, 10'000}
Table 2: Effect of Introducing an Award on the Contribution to a Public Good

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willingness to share the finding</td>
<td>Coefficient</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Ln(Value)</td>
<td>0.07**</td>
<td>0.07</td>
</tr>
<tr>
<td>ValueZero: CHF 0</td>
<td>(0.02)</td>
<td>(0.20)</td>
</tr>
<tr>
<td>ValueLow: CHF 50, 150, 300</td>
<td>0.07</td>
<td>0.52*</td>
</tr>
<tr>
<td>ValueMedium: CHF 1’000, 2’000, 4’000</td>
<td>0.52*</td>
<td>(0.21)</td>
</tr>
<tr>
<td>ValueHigh: CHF 6’000, 8’000, 10’000</td>
<td>0.54**</td>
<td>(0.21)</td>
</tr>
<tr>
<td>Intranet</td>
<td>0.26</td>
<td>0.28</td>
</tr>
<tr>
<td>Ceremony</td>
<td>0.44*</td>
<td>0.47*</td>
</tr>
<tr>
<td>Gift</td>
<td>-0.33(*)</td>
<td>-0.31(*)</td>
</tr>
<tr>
<td>Type of Reward*</td>
<td>-0.04</td>
<td>-0.10</td>
</tr>
<tr>
<td>#Recipients</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Baseline</td>
<td>0.90**</td>
<td>0.90**</td>
</tr>
<tr>
<td>Constant</td>
<td>0.28</td>
<td>0.37</td>
</tr>
<tr>
<td>Observations</td>
<td>208</td>
<td>208</td>
</tr>
<tr>
<td>Individuals</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>R^2 within</td>
<td>0.12</td>
<td>0.14</td>
</tr>
<tr>
<td>R^2 between</td>
<td>0.85</td>
<td>0.85</td>
</tr>
<tr>
<td>R^2 overall</td>
<td>0.78</td>
<td>0.78</td>
</tr>
</tbody>
</table>

Notes: Random effects estimation; Standard errors are displayed below the coefficients in parentheses.
** statistically significant at 99% level, * significant at 95% level, (*) significant at 90% level.
* Reference group: Monetary incentive/bonus
<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willingness to share the finding after revealing the winners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received/Not Received</td>
<td>0.71*</td>
<td>1.86</td>
</tr>
<tr>
<td>(0.31)</td>
<td>(1.57)</td>
<td></td>
</tr>
<tr>
<td>Ln(Value)</td>
<td>-0.00</td>
<td>0.03</td>
</tr>
<tr>
<td>(0.06)</td>
<td>(0.10)</td>
<td></td>
</tr>
<tr>
<td>Intranet</td>
<td>-0.08</td>
<td>0.55</td>
</tr>
<tr>
<td>(0.33)</td>
<td>(0.49)</td>
<td></td>
</tr>
<tr>
<td>Ceremony</td>
<td>-0.71</td>
<td>-0.34</td>
</tr>
<tr>
<td>(0.45)</td>
<td>(0.84)</td>
<td></td>
</tr>
<tr>
<td>Gift</td>
<td>0.41</td>
<td>0.10</td>
</tr>
<tr>
<td>(0.39)</td>
<td>(0.77)</td>
<td></td>
</tr>
<tr>
<td>Type of reward†</td>
<td>-0.07</td>
<td>0.28</td>
</tr>
<tr>
<td>(0.42)</td>
<td>(0.71)</td>
<td></td>
</tr>
<tr>
<td>#Recipients</td>
<td>-0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td>(0.02)</td>
<td>(0.04)</td>
<td></td>
</tr>
<tr>
<td>Ln(Value)*Received</td>
<td></td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td></td>
</tr>
<tr>
<td>Intranet*Received</td>
<td></td>
<td>-1.26(*)</td>
</tr>
<tr>
<td></td>
<td>(0.71)</td>
<td></td>
</tr>
<tr>
<td>Ceremony*Received</td>
<td></td>
<td>-0.62</td>
</tr>
<tr>
<td></td>
<td>(1.04)</td>
<td></td>
</tr>
<tr>
<td>Gift*Received</td>
<td></td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>(0.92)</td>
<td></td>
</tr>
<tr>
<td>Type of Reward**Received</td>
<td></td>
<td>-0.55</td>
</tr>
<tr>
<td></td>
<td>(0.93)</td>
<td></td>
</tr>
<tr>
<td>#Recipients*Received</td>
<td></td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td></td>
</tr>
<tr>
<td>Sharing4**Received</td>
<td></td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>(0.21)</td>
<td></td>
</tr>
<tr>
<td>Baseline*Received</td>
<td></td>
<td>-0.08</td>
</tr>
<tr>
<td></td>
<td>(0.22)</td>
<td></td>
</tr>
<tr>
<td>Sharing4*</td>
<td>0.63**</td>
<td>0.61**</td>
</tr>
<tr>
<td>(0.10)</td>
<td>(0.16)</td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.35**</td>
<td>0.39*</td>
</tr>
<tr>
<td>(0.10)</td>
<td>(0.15)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.04</td>
<td>-0.73</td>
</tr>
<tr>
<td>(0.69)</td>
<td>(1.23)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>Adj R^2</td>
<td>0.86</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Notes: OLS – Estimation; Standard errors are displayed below the coefficients in parentheses.
** statistically significant at 99% level, * significant at 95% level, (*) significant at 90% level.
† Reference group: Monetary incentive/bonus
‡ Sharing4 is the willingness to share the finding that the subjects indicated after vignette 4, i.e. after the announcement of reward 4, but before learning whether they received reward 4 or not.
Table 4: Predicted Behavior for Example Awards at IBM

<table>
<thead>
<tr>
<th></th>
<th>Example 1) – formal award without ceremony</th>
<th>Example 2) – formal award with ceremony</th>
<th>Example 3) – informal award with cash</th>
<th>Example 4) – informal award with gift, small value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average baseline motivation</strong></td>
<td>7.39</td>
<td>7.39</td>
<td>7.39</td>
<td>7.39</td>
</tr>
<tr>
<td><strong>Predicted motivation upon award announcement</strong></td>
<td>7.76 (0.26)</td>
<td>7.94 (0.25)</td>
<td>7.70 (0.23)</td>
<td>6.94 (0.20)</td>
</tr>
<tr>
<td><strong>Predicted motivation after revealing the recipients of winner</strong></td>
<td>7.95 (0.45)</td>
<td>7.43 (0.50)</td>
<td>7.82 (0.40)</td>
<td>7.83 (0.31)</td>
</tr>
<tr>
<td><strong>Predicted motivation after revealing the recipients of loser</strong></td>
<td>7.24 (0.47)</td>
<td>6.72 (0.53)</td>
<td>7.11 (0.42)</td>
<td>7.12 (0.33)</td>
</tr>
</tbody>
</table>

*Notes*: Standard errors of prediction are displayed in brackets.