



And the winner is...? The motivating power of employee awards



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ABSTRACT

This paper reports the findings from a survey experiment conducted online at IBM to assess the impact of employee awards on behavior in the workplace. We document that the introduction of a hypothetical award has statistically significant effects on the stated willingness to contribute to a public good. Our design allows us to estimate the impact of different award characteristics related to, for example, how public or how valuable the award is. The stated willingness to share important information with colleagues 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. Moreover, publicity has a substantial positive effect: a ceremony increases stated contributions by as much as increasing the value of the award from \$0 to \$1000.

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1. Introduction

Lack of recognition and appreciation is a major reason why people leave organizations, second to a lack of career development opportunities (Elsdon, 2002).¹ However, despite a general agreement that recognition is important, its motivating power is not sufficiently exploited in companies (Wiley, 1997). This underemployment of recognition as a human resources instrument is attributed to a lack of empirical support for strategies to motivate employees to improve performance (see also Pfeffer, 1995, 1998, 2001; Ambrose and Kulik, 1999; Luthans and Stajkovic, 1999).

This paper addresses the identified research gap into two ways. First, it provides clear empirical evidence on the impact of rewards on work performance. Second, it does so for a type of reward that has not received a lot of attention in the literature so far, namely for institutionalized recognition in the form of corporate employee awards.² Awards directly address recognition and praise – those motivational drives that have been identified as important but so far remain underexploited – and typically combine tangible incentives and recognition.³ In contrast to informal praise and feedback,

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¹ The importance of recognition for work motivation and job satisfaction has already been identified in earlier studies such as Dahrendorf (1959, p. 83) and Dunnette et al. (1967).

² In his book *1001 Ways to Reward Employees*, Nelson (2005) provides evidence for the variety of awards in companies ranging from *Employee of the Month* titles to *Bravo* and *Thanks* awards. Nelson and Spitzer (2003) list the various awards offered in big international companies such as IKEA, McDonald's or SONY. Awards are also used in small and mid-sized companies. Examples are provided in the *Strategic HR Review* that regularly devotes an entire section to successful company award programs (examples are Addison, 2005; Keating, 2007).

³ Depending on the relative salience of recognition vis-a-vis the financial component of awards, their effect might resemble the one of pure financial rewards or the one of recognition without pecuniary benefits.

which are typically outside the realm of what the company can strategically influence and plan, awards can be incorporated into a company's official human resources strategy. Moreover, and probably most importantly, our research design allows us to isolate the relative importance of different award characteristics, related to, for example, how public or how valuable the award. This allows us to assess the relative effectiveness of increasing the financial stakes in comparison to increasing the recognition component by making the award more public and, thereby, to quantify the effectiveness of publicity in financial terms. This is interesting not only with respect to the study of employee awards but more generally as it also has implications for the optimal design of bonus schemes and the question as to whether recipients should be made public.

There is a small but growing literature in economics studying employee awards. Early examples include Hansen and Weisbrod (1972), Frey (2006, 2007), and Frey and Neckermann (2008), who provide general accounts of awards. Theories on awards have been developed by Gavrilu et al. (2005), who describe the optimal solution for the management of awards over time and Besley and Ghatak (2008) who analyze a principal-agent setting with non-monetary incentives such as job titles or awards. Empirical evidence on awards is provided by Markham et al. (2002), who show in a quasi-experimental setting that the introduction of a public recognition program lowered absenteeism by 52%. Kosfeld and Neckermann (2011) show in a field experiment that the announcement of a non-material reward increases productivity by approximately 10%. Ashraf et al. (2011) compare the effect of financial and non-financial rewards on sales of condoms in a developmental aid context and find positive effects of non-pecuniary awards. Gubler et al. (2013), by comparison, document in a field setting that awards might not always work well but that the introduction of an award for tardiness can even reduce performance of agents that were punctual before the introduction. Neckermann et al. (2009) analyze whether the receipt of an award affects subsequent performance and show that award winners significantly increase their performance in the month following the award, while the performance of non-recipients remains unaffected. Malmendier and Tate (2008) also show how the receipt of a title like *CEO of the Year* affects subsequent performance. While these studies demonstrate that awards affect behavior, they do not provide insights into which award features drive this effect. However, understanding the relative importance of different award characteristics is important for practitioners designing and implementing an award system as well as for academics trying to understand the underlying motivational mechanisms.

The lack of academic attention devoted to this incentive instrument is probably driven by the fact that awards are difficult to study. In the lab, it is difficult to create a meaningful award situation because the value and consequences of awards are socially determined by the interaction with other members of society. In the field, it is hard to find suitable control groups as awards are typically not handed out randomly, and it is difficult to measure performance as awards typically reward vague outputs that go beyond normal duty. Moreover, a precise definition of what constitutes a corporate award system is lacking from an academic point of view. When practitioners discuss recognition programs, they refer to a variety of interventions that represent incentive instruments designed to reward at a low cost.

In line with Markham et al. (2002), we understand awards as extrinsic, predominantly non-material incentives allocated through an institutionalized recognition program. The formal character of awards clearly distinguishes them from spontaneous feedback and praise. They derive their motivating power from providing a combination of feedback, status and recognition and – often small – material incentives. Further, they contribute to the

work environment by influencing organizational norms and by highlighting role models of exemplary performance.

This paper addresses two main questions:

- How important are the individual features of an award for employee motivation (e.g. the scarcity, the degree of publicity, the associated monetary bonus)?
- What happens when employees receive an award; do winners increase or decrease their performance; how do non-recipients react?

To answer these questions, a survey experiment was conducted online with the employees of an IBM research laboratory. The survey focuses on the quantitative effect of introducing and handing out an award on voluntary work behaviors and analyzes which award characteristics determine the size of the effect. We find that respondents react systematically to the announcement of the award: the willingness to contribute to a public good 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. Stated contributions are significantly higher for awards whose winners are publicized within the company and for awards whose winners are celebrated in a public ceremony. Naming the recipients and having a ceremony increases contributions by as much as increasing the value of the award from \$0 to \$1000. This large effect points to the importance of status considerations as work incentives. It is particularly noteworthy as announcing the names on the intranet and having a ceremony is not very costly for the company (especially if the ceremony is coupled with some other organizational event). We find that individuals who hypothetically receive the award subsequently increase their stated willingness to share, whereas hypothetical non-recipients decrease it. The following section describes the technique, set-up of the study, as well as the theories guiding the research design. We then present the results and conclude with a discussion of the results and implications.

2. Method

We use a survey experiment in which short descriptions of hypothetical situations called vignettes are presented to the subjects. Subjects are then asked to indicate their behavior in case of the described situation. Each situation 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. Further methodological information is provided in Rossi and Anderson (1982), McFadden (2001), and Hensher et al. (1999).⁴ Each individual responds to a number of different vignettes so that individual fixed effects can be estimated. Having individuals respond to a number of different scenarios is similar to the strategy method in economics (Selten, 1967). In the strategy method, individuals are asked to indicate contingent choices for all of the possible decision nodes in the game. Research has shown that behavioral responses

⁴ Vignette studies are a common research tool in health economics, sociology, and marketing, and there exists a large literature on the method and its reliability and external validity. In behavioral economics, Falk and Kosfeld (2006) use this technique to complement their set of experiments assessing the impact of control on effort in the workplace. Lacetera and Macis (2010a) use a vignette design to study the effectiveness of material and non-material incentives in increasing blood donations.

differ very little between the strategy method and sequential play (game method) for some games (e.g., Brandts and Charness, 2000; Cason and Mui, 1998; Oxoby and McLeish, 2004), although not for all (e.g., Brosig et al., 2003).

Traditional survey approaches tend to elicit unreliable and biased self-reports as the questions are too abstract (see Bertrand and Mullainathan, 2001; Alexander and Becker, 1978). The vignette technique is preferable because vignettes closely resemble real-life decision-making situations and are precisely specified so that the information that is available to subjects when making their decisions is standardized. 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 to 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 toward 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. Among many others, Telser and Zweifel (2007) demonstrate the ability of vignette experiments to predict choice behavior. Moreover, results from vignette studies have been shown to be reliable over time, attribute sets, and data collection methods (Bateson et al., 1987).

While vignette studies in general are good predictors of actual choice behavior, some systematic differences between stated and revealed choices have been documented. One such difference relates to the salience of financial rewards. In the experiment of Jeffrey (2007), subjects state that they prefer a financial reward over a gift of the same value. Nevertheless, they subsequently work harder for the gift than for the financial reward. According to the author, subjects find it easier to justify the desirability of financial rewards to themselves. Similarly, Frey and Stutzer (2006) suggest that individuals cognitively overestimate the utility from money and underestimate the utility consequence of less salient goods such as hobbies and friendships. A similar case can be made for the public ceremonies since these are also a very salient feature of awards. Related is the so called hypothetical bias which refers to the fact that hypothetical valuation statements generally exceed actual payments (Bohm, 1972, and, related, Levitt and List, 2007 on the generalizability of laboratory experiments). These latter issue is of less concern for our design as we discuss below.⁵

With respect to the study of awards, this approach was chosen because the vignette technique has several advantages over laboratory experiments. First, awards present non-monetary, social incentives. Their value – or at least a major part of it – depends on a meaningful relationship of the recipients with both the award giver and the co-workers. Hence, we would expect that giving awards would not function well in an anonymous lab setting with an abstract effort task and the experimenter as the award-giver. Second, the investigation of the relative impact of certain award characteristics requires a random variation in the award characteristics over employees of the same company to hold all other factors constant. However, offering different rewards to employees in similar positions at the same company is typically not possible in the field. Third, another advantage of vignette studies is that they provide more control than qualitative or observational

studies and, at the same time, put respondents in natural situations and involve decisions about bundles of factors. At the same time, vignette studies exhibit a high degree of uniformity and control over the stimulus situation approximating that achieved by researchers using laboratory experimental designs. Confounding factors are not a problem because vignettes are randomly assigned to a large number of subjects. This ensures that the causal factors are uncorrelated on average, which allows the econometric estimation of effects.

Vignette studies are typically not incentivized, and one might doubt the accuracy of the stated answers and their capacity to predict actual work behavior. In our particular case, however, there are no strategic reasons to influence the answers. Importantly, any potential upward bias in the stated contributions to the public good do not matter for the analysis as we only look at differences in stated contributions for awards with different characteristics. Moreover, we control for individual fixed effects, which filters out some – if not all – of the potential upward biases in the level of contributions.

2.1. Operationalization of reward treatments and study design

Each vignette describes the introduction of a new incentive for all employees at the IBM research lab. All vignettes have identical textual descriptions; they only differ in terms of the realized factor levels in each of the four different vignette dimensions. 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. In a pre-study, we surveyed awards at different companies and conducted interviews with a number of human resource managers. For the present study, we chose those four orthogonal factors that were considered to be important by all managers and that varied most between the different awards surveyed.⁶

2.1.1. Factor 1, type of reward that accompanies the award

According to standard economic theory compensation should 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 does not lead to a higher utility than the equivalent payment in cash, which makes gifts inferior 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; Bénabou and Tirole, 2006). Social and cognitive psychology describe further advantages of gifts, so far neglected in economics, that may be sufficient to reduce or eliminate any inherent advantage of cash as an incentive (Jeffrey and Shaffer, 2007). Examples include the social reinforcement associated with the greater visibility of tangible gifts as compared to monetary rewards and that the perceived value of gifts typically exceeds their monetary value due to the emotional reaction triggered by the hedonic nature of most gifts. To shed light on this theoretical discord on 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.

2.1.2. Factor 2, degree of publicity

In addition to the motivational power of the prospect of winning the incentive per se, rewards can function as signals to outsiders of the recipient's ability and motivation (see e.g., Spence, 1973, 1974) and thus bring social recognition by an extended set of colleagues

⁵ We do not analyze the level of the stated behavior but look at differences in responses between different hypothetical situations that should all be subject to the same potential upward bias in the level of answers.

⁶ Appendix A contains the wording of the four factors as well as information on how the factors were operationalized in the statistical analysis.

(see Frank, 1985; Auriol and Renault, 2008 on status and Ellingsen and Johannesson, 2007 on the importance of prestige and respect). This requires a degree of publicity; other persons need to know about the award. In a similar vein, Lacetera and Macis (2010b) study the impact of publicly and privately awarded non-monetary prizes for blood donation and find that publicity matters.

To measure the behavioral impact of visibility, each vignette contained one of the following three types of publicity: The list of recipients could remain undisclosed, be published on the intranet, or be published on the intranet and presented at a ceremony. As with all vignette dimensions, the type of publicity was randomly selected for each vignette.

2.1.3. Factor 3, amount of cash/value of gift

The accompanying cash payment or gift of the rewards described in the vignettes varied in value between \$0 and \$10,000. The set of possible values was \$0, \$50, \$150, \$300, \$1000, \$2000, \$4000, \$6000, \$8000, and \$10,000. For the gifts, we used four categories: zero, small (about \$150), medium (about \$2000), and high value (about \$8000).⁷ We expect that motivation increases with the value of the reward.

2.1.4. Factor 4, the maximum number of recipients

Awards only work as incentives if the prospective recipients value them. The perceived (positional) value of an award crucially depends 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.⁸ Hence, the effect of awards should be lower when there are more recipients. However, there is a countervailing effect. An increase in the number of reward recipients, *ceteris paribus*, increases the chances for every individual employee to win. Hence, we hypothesize an inverted u-shaped relationship between the number of recipients and motivation in the overall population. 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 rate (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. Interviews revealed that these numbers correspond to what employees consider to be a small, medium, and large number of recipients.⁹

Table 1 gives an overview of the factors and their levels. Further details are provided in Appendix A. Subjects answer to a number of different situation descriptions. The effect of the award characteristics on these responses is evaluated with multiple-regression analysis.

2.2. An illustration of a vignette

Individual vignettes, i.e., award descriptions, are constructed by randomly choosing one factor level from each of the indepen-

Table 1
Awards: factors and their levels.

Factor	Factor levels
Type of accompanying reward: (categorical)	Gift, cash payment
Degree of publicity: (categorical)	Anonymous, intranet announcement, intranet with ceremony
Monetary value of cash payment or gift: (continuous)	\$X ^a
Maximum number of recipients: (continuous)	# ^b

^a $X \in \{0, 50, 150, 300, 1000, 2000, 4000, 6000, 8000, 10, 000\}$. \$0, \$150, \$2000, \$8000 represent the gifts of zero, small, medium or high monetary value in the statistical analysis.

^b $\# \in \{1, 2, 6, 10, 16, 20\}$.

Both variables are treated as continuous in the statistical analysis.

dent factors.¹⁰ The total pool of vignettes comprises all possible factor combinations. The four vignettes for each subject were sampled without replacement from this pool. Not all possible vignettes have to be answered as long as the levels of the different factors in the set of vignettes are uncorrelated, i.e., as long as there is little multi-collinearity, and as long as there is sufficient variation in the vignettes. In the sample of vignettes drawn in our study both conditions are met. We also do not have an endogeneity problem as all respondents answered to all the vignettes presented to them.¹¹

Below, we display a specific vignette. The realized factor levels are marked in bold. The 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 is presented in Appendix B.

Example of a vignette:

"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 recognition of the recipients' contribution, the **award comes with a ballpoint pen labeled 'Thank you for your exceptional contribution!'** (factor 1: *type of accompanying reward*; level: *gift* & factor 3: *value of gift*; factor level: \$0).

There will be **up to 16 recipients** (about 6% of researchers and non-technical staff) per year in this lab (factor 4: *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 2: *degree of publicity*; factor level: *ceremony and publication on the intranet*)."

⁷ In the statistical analysis, *monetary value* was treated as a continuous variable. In the case of gifts the medium value of the respective value category was used. Hence, fewer observations per factor combination are necessary to reliably estimate the impact of a certain factor than what would have been necessary had we attempted to estimate the effect with mean-comparisons between all treatment cells. We present specifications where the award value enters linearly, but also specifications with dummies representing the reward value categories.

⁸ 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.

⁹ Like the monetary value of the reward, the number of recipients is treated as a continuous variable in the statistical analysis.

¹⁰ While the assignment of vignettes to individual respondents was random, we ensured that the four 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 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. In interviews with employees preceding the study we further inquired whether respondents found the different factor combinations realistic, which was the case.

¹¹ Of the 216 observations for the willingness to contribute, only five present instances in which "no answer" was marked. These "no answers" do not correlate with any specific award features.

2.3. Operationalization of the dependent variable

The subjects were asked to indicate 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. Hence, individuals acting in the interest of the company would share immediately, whereas those caring more about their private benefit would wait and share later. 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 dilemma 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. Appendix B contains the wording of the situation description and the questions asked.

2.4. 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). Then, subjects were sequentially confronted with four 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 each subject answered to four different vignettes, we have multiple observations per person and can control for effects specific to the individual. Due to time constraints, it was not possible to include more than four vignettes per subject. These four reward descriptions per individual present a random set out of the total pool of different reward descriptions, i.e., combinations of values in the four dimensions that characterize each reward. After the fourth vignette, subjects were randomly informed that they either did or did not receive the reward that was described to them in the final award introduction scenario (vignette 4) and asked again how willing they were to share the finding now that they know whether they received reward 4 or not.¹² Because this question was asked only once, we have only one observation of the motivation after revealing the recipients per respondent. However, we can still draw general conclusions as the fourth and final reward descriptions represent a random draw from the set of all possible vignettes. The survey ended with a section in which respondents were asked questions about personal characteristics,¹³ their perception of the role of awards in organizations, and the determinants of award effectiveness in motivating employees. The questions in the survey section were the same for all participants, and they were placed at the end of the experiment to ensure that subjects are primed as little as possible. Participants were informed about this entire sequence of questions at

the beginning of the survey. The respondents progressed through the questionnaire as shown below.¹⁴

1. Each subject is asked about their behavior in the public good situation given their current work environment, i.e., no additional new incentive.
2. Each subject is presented with their particular realization of vignette 1 and then asked about their behavior in the public good situation.
3. Each subject is presented with their particular realization of vignette 2 and then asked about their behavior in the public good situation.
4. Each subject is presented with their particular realization of vignette 3 and then asked about their behavior in the public good situation.
5. Each subject is presented with their particular realization of vignette 4 and then asked about their behavior in the public good situation.
6. Each subject learns whether they receive the reward described in vignette 4 and then asked about their behavior in the public good situation.
7. Each subject is asked a number of survey questions regarding their personal characteristics, their thoughts on the determinants of award success, and their ideas about how awards function in organizations.

2.5. Implementation

The vignette study was conducted in a two-week period in January and February, 2007 with the 177 researchers of one IBM research lab. The lab is one of eight research labs that IBM maintains worldwide. 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 have been awarded Nobel prizes in physics for research conducted during their time as employees at this IBM lab. The management hands out the approximately 20 different awards that are available in all IBM research labs. The awards can be broadly separated into formal and informal awards. Formal awards recognize outstanding scientific contributions and innovations, are associated with substantial monetary compensations, and recipients are announced on the worldwide intranet of IBM research. Informal awards honor exceptional motivation in general; examples are contributions to teams, passion for work, and customer service. 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 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.

The participants were invited to the study via an e-mail of the Human Resources Manager and were reminded with a second e-mail at the end of the first week. The questionnaire could

¹² Reasons for inquiring about motivation after revealing the recipients only once 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. 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.

¹³ Specifically, we inquired age, gender, income range, and award history at IBM. A question about the respondents' level of education was not included in the survey as all researchers have a university degree, and most also have a PhD.

¹⁴ To ensure that subjects did not use the first award description as their baseline/reference point and evaluated awards 2 to 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 \$50 to \$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. At the same time, we allow for individual specific effects in our analysis. This captures time-constant effects of the first vignette.

be accessed via a link provided in the e-mail. Anonymity was guaranteed. Participation in the study was voluntary, and there were no monetary incentives associated with it. During the survey period, 54 researchers (response rate 31%) completed the questionnaire, resulting in 211 observations (there are five instances in which a researcher marked “no answer”). The respondents are representative of the workforce (and therefore also to the non-respondents) with respect to all objective criteria available from the company (age, gender, length of employment).

3. Results

3.1. Awards as incentives

The average willingness to share the finding after the award was announced was 7.31 with a standard deviation of 2.67. Individuals made use of the full scale, and some individuals marked a willingness of 1 and others a willingness of 10. The majority of subjects marked a willingness between 7 and 10.

To test the effectiveness of the individual reward characteristics, we analyze the data with random effects OLS models. Unlike fixed effects models, these allow 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 initial 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 other estimation techniques like ordered probit, fixed-effect models, and OLS-regressions that do not include random effects.¹⁵ Appendix C presents the results of the different models. We present the random effects OLS rather than the ordered probit results in this section for ease of interpretation. The main regression includes four predictor variables associated with the four factors that were varied to produce specific vignettes. All observations are pooled because subjects receive no feedback between the different vignettes. Hence, there should be no dynamic adjustment of the stated contributions to the public good over time.¹⁶ We also included a predictor variable to control for variation in initial motivation among subjects. Model 1 in Table 2 shows the results.

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 diminishing marginal utility with respect to the monetary value of the reward.¹⁷ The coefficient of 0.07 implies that an increase in the value of the award from \$0

¹⁵ As 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 treated like continuous variables (e.g., Van Praag, 1991; Ferrer-i Carbonell and Frijters, 2004; Moffitt et al., 1999). Further, one might advocate the use of fixed effects models and only study within person variation. This is preferable when the unobserved individual effect 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, this assumption is not necessarily fulfilled a priori.

¹⁶ We also ran a model that includes dummies for whether the vignette was first, second, third or fourth. The inclusion of these additional controls does not affect the results.

¹⁷ To construct the variable $\ln(\text{Value})$, $(\text{Value} + 1)$ is used since Value can be equal to \$0. We assume that observed behavior for \$0 is not markedly different from what one would observe for \$1. Including a dummy for every possible monetary value, which

Table 2
Effect of award factors on public good contributions.

	Model 1	Model 2
Ln(Value)	0.071*** (0.021)	
ValueLow: \$50, 150, 300 ^a		0.032 (0.198)
ValueMedium: \$1000, 2000, 4000 ^a		0.561*** (0.198)
ValueHigh: \$6000, 8000, 10,000 ^a		0.587*** (0.203)
Intranet announcement ^b	0.307 (0.185)	0.334 (0.186)
Ceremony ^b	0.486** (0.206)	0.501** (0.207)
Gift ^c	-0.404** (0.148)	-0.408*** (0.150)
# Recipients	0.008 (0.010)	0.009 (0.010)
Initial motivation	0.881*** (0.056)	0.881*** (0.054)
Constant	0.274 (0.475)	0.344 (0.463)
Observations	211	211
R ² within	0.130	0.148
R ² between	0.811	0.813
R ² overall	0.753	0.756

Note: Random effects OLS regressions; standard errors in parentheses. The dependent variable is the willingness to share an important finding with colleagues as indicated by the respondents on a 10-point scale ranging from 1: “I would definitely not share now” to 10: “I would certainly share now”.

^a Reference category: zero monetary value.

^b Reference category: private conferral of award.

^c Reference category: cash payment as accompanying reward.

** $p < 0.05$.

*** $p < 0.01$.

to \$150 increases the stated contributions by 0.35 on a 10-point scale. An increase from \$0 to \$2000 increases it by 0.52; an increase from \$0 to \$8000 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 (Wald test for equality of coefficients, p -value 0.89). Compared to the latter, zero or small monetary values lead to a motivation that is half a point lower on a 10-point scale. This difference is statistically significant. In the qualitative survey conducted after the vignette study, the responding employees confirmed the importance of the monetary character 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 different 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 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. Finally, employees care about the award but they also care about extra income.

Both forms of publicity, *announcements of the winners on the intranet* and *ceremonies*, have a positive effect on stated contributions to the public good. Compared to a situation with no publicity, contributions are on average 0.49 points higher when there is a ceremony, which is substantial. Naming the recipients and having a ceremony increases contributions by as much as increasing the

is the most flexible functional form, confirms that the logarithmic specification is appropriate.

value of the award from \$0 to about \$1000. 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.¹⁸ The coefficient of having a ceremony and announcing the winners on the intranet is larger than the coefficient of an announcement on the intranet alone. For the rewards to serve as signals, only the announcement is necessary. While this difference is not statistically significant at the conventional levels (Wald test for equality of coefficients, p -value 0.50), the larger coefficient on the combination of intranet and ceremony suggests that employees value the ceremony per se.

For a given monetary value, *gifts* work less well than *payments in cash*. Holding the value of the reward constant, a gift leads to a willingness to share that is 0.40 points lower than the willingness induced by an equivalent payment in cash. The size of this effect is substantial. It corresponds to an increase of the monetary value from \$0 to \$300. 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. Waldfoegel (1993) also documents the inferiority of gifts to cash payments.¹⁹

The *number of recipients* 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. We also check for the hypothesized inverted U-shaped relationship by including the square term of number of recipients. While the coefficients of number of recipients and its square term are statistically insignificant, they have opposing signs, indicating that two countervailing effects might be at work.

Initial 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. Subjects that differ in their initial motivation do not markedly differ in their reaction to the introduction of an incentive. Splitting the sample along the median initial motivation, there are no statistically significant differences to the different award characteristics with the exception of value which has a larger impact on the stated willingness to share the finding of subjects with below median initial motivation.

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 stated sharing behavior. All of these variables are statistically insignificant, and the Akaike information criterion indicates that adding them to the estimated models above does not increase the informational content enough to justify their inclusion. The same is true for interaction effects. While there may be order effects, they only introduce noise and do not bias our results.

¹⁸ Similarly, publicity contributes to increasing transparency in the organization and the team as to who has made the important finding and hence deserves the credit for it.

¹⁹ One might hypothesize that the type of the reward interacts both with the value of the reward as well as and with the degree of publicity as in that subjects might not want to appear as being to be greedy. Since looking at these effects was not part of our initial experimental design, we do not have the statistical power to detect such differential effects with the sample that we have. The point estimates do, however, suggest that publicity works better when the reward comes in the form of a gift than when it comes as cash. The same is true for zero and low as compared to medium and high financial value.

Our data suggest 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: (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) publicity matters greatly. The fact that ceremonies have a larger impact than a publication on the intranet suggests that recipients value direct personal recognition.

3.2. The effect of receiving and not receiving the award

Our design also allows us to provide some insight into how people react to being told whether they receive or do not receive a reward. While economic status models (e.g., Auriol and Renault, 2008) and some psychological literature (e.g., Ambrose and Kulik, 1999) posit a positive effect on effort of receiving and a negative effect on effort of not receiving the award, 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 the last vignette was presented, we randomly informed respondents whether or not they received the presented award. Then we asked each respondent again to indicate how willing they were to share the finding now that they knew whether they were a winner or a non-recipient 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 received the reward is the main independent variable. In addition to the reward factors, we control for initial motivation and the incentive effect of the award, *Sharing4*. These results have to be interpreted with care as the award was assigned randomly, that is, the described receipt of the award did not depend on the willingness to share the finding as indicated by the respondent in response to the previous vignettes. This has the advantage that assignment of the award is independent of previously stated performance, and that, hence, the sample of hypothetical winners is comparable to the sample of hypothetical non-recipients. However, respondents might have considered this assignment rule as odd as in their daily experience awards always reward good performance. With respect to managerial implications, it might have been equally interesting to isolate the effect of receiving an award on high-performers. *Sharing4* presents 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.

The motivation of winners is statistically significantly higher than the motivation of losers. The difference in contribution is 0.70 on a 10-point scale. Persons with a higher initial 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. The award factors do not have a robust statistically significant direct effect on the motivation after announcing the winners. However, the previous analysis showed that the factors significantly affect *Sharing4* (the contribution stated after the introduction, but prior to conferral of reward 4). Via this channel, the award factors also affect performance after conferral. 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. The results, which are displayed in Model 2 of Table 3 indicate that the award

Table 3
The effect of receiving or not receiving an award.

	Model 1	Model 2
Received ^a	0.701*** (0.295)	1.778 (1.496)
Ln(Value)	–0.001 (0.057)	0.039 (0.093)
Intranet announcement ^b	–0.069 (0.319)	0.530 (0.480)
Ceremony ^b	–0.732 (0.427)	–0.245 (0.791)
Gift ^c	0.373 (0.314)	0.324 (0.519)
# Recipients	–0.018 (0.024)	–0.018 (0.037)
Sharing4	0.629** (0.094)	0.611** (0.152)
Initial motivation	0.352** (0.102)	0.396*** (0.148)
Ln(Value) × Received		–0.059 (0.126)
Intranet × Received		–1.224 (0.687)
Ceremony × Received		–0.809 (0.968)
Gift × Received		0.213 (0.678)
# Recipients × Received		0.014 (0.051)
Sharing4 × Received		0.063 (0.202)
Initial motivation × Received		–0.101 (0.214)
Constant	–0.054 (0.672)	–0.786 (1.197)
Observations	52	52
Adj. R ²	0.860	0.847

Note: Random effects OLS regressions; standard errors in parentheses. The dependent variable is the willingness to share an important finding with colleagues as indicated by the respondents on a 10-point scale ranging from 1: “I would definitely not share now” to 10: “I would certainly share now”.

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.

^a Reference category: non-recipient of award.

^b Reference category: private conferral of award.

^c Reference category: cash payment as accompanying reward.

** $p < 0.05$.

*** $p < 0.01$.

factors do not have statistically significantly different effects on winners and losers.

On average, losers decrease their motivation by 0.4, while winners increase it by approximately the same amount (separate calculation). 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. In order to assess the overall profitability of the award, the ex ante incentive effect of the award on all employees needs to be compared with the differential impact on winners and non-recipients. The aggregate motivation effect depends on the design of the specific award, i.e., on whether the award is public and on whether it is accompanied by a gift or by cash.

The differential effect on winners and losers should be interpreted with care. In contrast to the analysis in Section *Awards as incentives*, this analysis is based on differences in the absolute levels of the stated willingness to share a finding. Absolute levels might

be influenced by strategic reasoning and social desirability.²⁰ Nevertheless, it suggests that recognition might actually cut both ways (reduce motivation for some who don't get it, while raising it for others who did, or for those who hope to in the future). This issue presents an interesting venue for future research.

4. Discussion

This paper addresses the question about which characteristics drive the effect of an award, and how winners and non-recipients react to the conferral of an award. 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 it is lower for gifts than payments of corresponding value. Contributions are significantly higher for awards whose winners are publicized within the company and for awards whose winners are celebrated in a public ceremony. Our design allows us to monetize the effects: adding a ceremony and publishing the names of the winners on the intranet increases motivation by as much as what could be achieved by increasing the monetary value of the accompanying cash bonus from \$0 to \$1000. The value of gifts need to be approximately \$300 higher than the one of cash payments to achieve the same level of motivation. Upon receipt, non-recipients decrease and recipients increase their stated contributions relative to the motivation they indicated before the award was announced. These ex post effects are independent of the specific kind of award. The results suggest that award systems need to be designed carefully because the different award characteristics have individual effects on motivation. In general, good award systems should minimize the negative impact of awards on non-recipients and incorporate those award characteristics that the employees value, such as publicity. This is necessary because the establishment of awards, as is the case for all incentive schemes, has risks; poorly designed awards may backfire.

Overall, this study adds to the literature by providing evidence that awards have a significant impact on motivation and induce systematic changes in stated behavior. The agents in this study are in a long-term employment relationship and work on a highly complex task that requires a high level of education and skill. The vignette technique has the advantage of being able to exploit this natural setting and permits the researcher to isolate the effects of individual factors without artificially restricting the number of factors present.

The evidence presented does not allow us to make a final assessment of the overall profitability of introducing an award. Predicting the overall quantitative change in behavior due to the introduction of an award is difficult 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. Moreover, it is unclear how the incentive effect changes over time as heterogeneous employees both win and lose multiple awards. The profitability of awards for a 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. Future research should address this issue as well

²⁰ As we have only one observation per subject for this question, we cannot control for individual specific effects in the analysis. Also, subjects might be prompted to state a high/low willingness to share in response to this question because being a winner/non-recipient was the only new information revealed to the subjects at this point. The vignette descriptions above, in contrast, were made up of an entire bundle of award characteristics that all changed simultaneously between different vignettes so that the attention of subjects was not focused to changes in an individual award dimension.

as provide evidence on observed behavior and on mediating factors like the nature of the task.

Appendix A. Wording of the levels of the reward characteristics

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

Factor 1, the type of accompanying reward

The wording of this factor depended on the monetary value of the reward (factor 3) and will be presented in the description of factor 3 below.

Factor 1, level a: gift.

Factor 1, level b: cash payment.

In the regression models factor 1 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.

Factor 2, the degree of publicity

The three factor levels had the following texts.

Factor 2, level a: anonymous.

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

Factor 2, level b: announcement on the intranet.

"The lab director congratulates the winner(s) privately. Award recipients are published on the intranet."

Factor 2, 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."

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 3, 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 award came with a cash payment (factor 2, level b), one of three numerical values was selected from the category selected in step one.

Factor 3, level a: zero monetary value

Factor 3, level b: small monetary value (\$50, 150, or 300)

Factor 3, level c: medium monetary value (\$1000, 2000, or 4000)

Factor 3, level d: high monetary value (\$6000, 8000, 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, 1000, 2000, 4000, 6000, 8000, and 10,000.

The wording of factor 3 depended on the type of accompanying reward (factor 1). Because 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 \$2000. 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 3 are displayed below.

Factor 3, level a: zero monetary value

Factor 1, 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!'"

Factor 1, level b, award with cash payment:

"The award is not accompanied by a payment in cash."

Factor 3, level b: small monetary value (\$50, 150, or 300)

Factor 1, 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."

Factor 1, level b, award with cash payment:

"The award comes with \$Y in cash.", where Y is randomly chosen from {50, 150, 300}.

Factor 3, level c: medium monetary value (\$1000, 2000, or 4000)

Factor 1, 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 Kunststube in Küssnacht, where the celebrity chef Horst Petermann will personally cater the party."

The value of this gift used in the regression was \$2000.

Factor 1, level b, award with cash payment:

"The award comes with \$Y in cash.", where Y is randomly chosen from {1000, 2000, 4000}.

Factor 3, level d: high monetary value (\$6000, 8000, or 10,000)

Factor 1, 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 \$8000. The value of the gift is based on the fact that IBM estimates that one workday for one employee is worth about \$1000.

Factor 1, level b, award with cash payment:

"The award comes with \$Y in cash.", where Y is randomly chosen from {6000, 8000, 10,000}.

Factor 4, the maximum number of recipients per year

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

Table C1
Comparison of different estimation techniques.

	OLS random effects	OLS fixed effects	Clustered OLS	Ordered probit random effects
Ln(Value)	0.071*** (0.021)	0.073*** (0.020)	0.069** (0.029)	0.121*** (0.028)
Intranet announcement	0.307 (0.185)	0.311 (0.195)	0.240 (0.285)	0.509** (0.252)
Ceremony	0.486** (0.206)	0.430** (0.212)	0.572 (0.344)	0.630** (0.278)
Gift	−0.404*** (0.148)	−0.384** (0.148)	−0.451** (0.192)	−0.534** (0.196)
# Recipients	0.008 (0.010)	0.004 (0.010)	0.016 (0.010)	0.004 (0.013)
Initial motivation	0.881*** (0.056)	.	0.886*** (0.066)	1.131*** (0.099)
Constant	0.274 (0.475)	6.806*** (0.200)	0.217 (0.719)	
Observations	211	211	211	211
Individuals	54	54	54	54
R ² within	0.130	0.131		
R ² between	0.811	0.010		
R ² overall	0.753	0.016	0.754	

Note: Random effects OLS regressions; standard errors in parentheses. The dependent variable is the willingness to share an important finding with colleagues as indicated by the respondents on a 10-point scale ranging from 1: "I would definitely not share now" to 10: "I would certainly share now". The dependent variable was rescaled to the interval from 0 to 9 for the ordered probit estimation. Standard errors are clustered on the level of the individual in the third column.

** $p < 0.05$.

*** $p < 0.01$.

regression models, factor 4 was treated as a quantitative variable, # Recipients, with values 1, 2, 6, 10, 16, and 20.

Appendix B. Instructions for the participants

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 the IBM research lab. **Every respondent receives a different set of 4 incentives.** The 4 incentives are randomly assigned. Here is an **overview** over the range of possible incentives: the incentives are either **cash incentives or awards**. They are **worth between \$50 and \$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**.

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.

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 in the team.
- You have never worked with the employees from the other labs in a team before. In 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.

Appendix C. Comparison of different econometric techniques

See Table C1.

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