Design a Contract: A Simple Principal-Agent Problem as a Classroom Experiment

Simon Gächter and Manfred Königstein

Abstract: The authors present a simple classroom experiment that can be used as a teaching device to introduce important concepts of organizational economics and incentive contracting. First, students take the role of a principal and design a contract that consists of a fixed payment and an incentive component. Second, students take the role of agents and decide on an effort level. The experiment illustrates shirking opportunities of the agent and the importance of work incentives. Furthermore, it can be used to introduce students to the concepts of contractual incompleteness, efficiency, incentive compatibility, outside options and participation constraints, the Coase theorem, and the potential roles of fairness and reciprocity in contracting.

Keywords: classroom experiments, Coase theorem, efficiency, incentive contracts, shirking
JEL codes: A22, C92

Contracting problems are arguably the most important common paradigm in courses on organizational economics, personnel economics, and contract theory taught in economics departments and business schools. This fact is documented, for example, in the textbooks by Milgrom and Roberts (1992), Lazear (1998), Baron and Kreps (1999), and Brickley, Smith, and Zimmerman (2001) that appear on many syllabi of organizational economics courses. These authors devote considerable space to the issue of contracting and the principal-agent paradigm. In the preface to their textbook, Brickley, Smith, and Zimmerman (2001, vii) note, “A quiet revolution is occurring within business schools. . . . Armed with powerful theories and access to unprecedented data, we now have a rich set of managerial insights to teach about the workings of organizations and markets.” One of these insights is certainly that the design of contracts and setting incentives are important management issues.

In this article, we present a simple classroom experiment on a two-person principal-agent game that we have found effective in introducing and illustrating
important concepts of organizational economics and contracting. Principal-agent problems have in common that prior to an appropriate contractual solution, agents have an incentive to behave opportunistically (in our context, to shirk on their work effort). Thus, a contractual solution must be found to avoid shirking. The main goal of our classroom experiment is to illustrate the problem of shirking and the need to find a contractual solution to avoid shirking. Our teaching experiment drives this point home in the framework of the frequently used gift-exchange game (e.g., Fehr, Gächter, and Kirchsteiger 1997) into which we introduce the possibility of profit sharing to solve the problem of shirking. Thus, as in the gift-exchange game, we model the incentive problem as arising in a situation of contractual incompleteness. That is, effort might be observable but not enforceable by third parties, such as courts.¹

In our experiment, students first take the role of a principal who may design a contract that is offered to an agent. Second, the students take the role of an agent who receives a contract and decides on individual effort. To motivate the principal’s problem, the students are asked to imagine being the owner of a company who lacks the expertise to run it alone. Therefore, an expert needs to be hired. The offered contract can specify two instruments of payment or a combination of the two: fixed payment, earnings share, or both. The fixed payment can be either positive or negative but must be between +700 and –700. If the fixed payment is positive, it is tantamount to a salary for the expert. If the fixed payment is negative, it is tantamount to a payment of the expert to the owner. The earnings share specifies the share of the return, which the expert can pocket for him- or herself, and it may be set between 0 and 100 percent (in multiples of 10 percent). For example, if the earnings share is 100 percent, the expert will receive all of the earnings. Thus, contract design allows for a variety of contracts including pure fixed-wage contracts and high-powered incentive contracts.²

In the second part of the experiment, all students assume the role of the expert. They first have to decide whether they accept or reject the contract they are offered. (We explain how this is done in the Procedures section.) If the contract is rejected, the expert earns an outside wage of 100, and the owner earns nothing. If the expert has decided to accept the contract, he has to choose a costly effort level that determines the company’s return. The return is split between the owner and expert according to the terms of the contract; the expert bears the cost of effort.

There are 10 effort levels (from 1 to 10) and costs are increasing and convex in the effort level. Efficiency requires that the expert chooses the highest effort level but, under standard assumptions of rationality and selfishness, the expert will choose the lowest effort level. Thus, to induce an opportunistic expert to exert the highest effort level, the owner has to give the expert a sufficiently large share of the earnings. Specifically, in the subgame perfect solution, if the owner is rational and selfish, he will offer an earnings share of 100 percent and ask for the whole generated surplus minus 100 (i.e., the expert’s outside wage).³

This teaching experiment is simple and easy to implement. The role change in the two parts of the experiment simplifies procedures considerably because the instructor does not have to match principals and agents (who would otherwise be idle until their principal has reached a decision). Moreover, the design allows for
gathering data from all students in both roles, which also often results in interesting behavioral patterns and subsequent discussions.

The experiment is designed to teach the following key insights: First, a fixed wage gives the agent an incentive to shirk. Second, a more complex contract needs to be designed to avoid the shirking problem; high-powered incentives are sufficient if agents are rational. Unlike many textbook examples of principal-agent problems, we do not rely on asymmetric information (and risk aversion) to teach these insights. However, the design can be extended easily to incorporate asymmetric information (see the Adding Asymmetric Information section).

Our experiment addresses concepts that underlie all contract design issues, irrespective of whether there is asymmetric information or whether agents are risk averse. In addition to those mentioned previously, our experiment can be used to discuss the concepts of efficiency, incentive compatibility, and outside options as well as the participation constraint. It can also be used to discuss the Coase theorem and the potential roles of fairness and reciprocity in contracting. Furthermore, the game helps illustrate important principles of optimal behavior (e.g., determining the optimal effort level by using a marginal cost equals marginal benefit analysis), the concept of the disutility of effort and when one needs incentives, and the necessity and difficulty of anticipating the behavioral reactions to the terms set in a contract. In our experience (from teaching Master of Business students and business and economics undergraduates), our experiment also prepares students for introductions to more complex concepts such as asymmetric information, risk aversion, and agency costs.

**PROCEDURES**

The experiment consists of two parts. In the first part, all students act in the role of the owner (i.e., principal). In the second part, which we do not announce to students beforehand, all students decide in the role of the expert (i.e., agent). In this section, we use the terms owner and expert to explain the procedures rather than principal and agent because the former terminology is also used in the instructions. We revert to the principal-agent terminology in later sections because it is more familiar in discussing theoretical issues.

Class size does not matter much for this experiment. We ran the experiment with classes of 20–40 students in which each student decided alone. In large classes, teams of two or three students may be formed. This might have the advantage that after discussion, among team members, decisions are considered more thoroughly.

The experiment does not need much preparation. The instructor only needs to copy the instructions, the contract design sheet of the owner, and the effort decision sheet of the expert. We found it useful to put the instructions on one piece of paper and the contract design sheet of the owner and the effort decision sheet of the expert on two separate sheets of paper. It is also helpful to use different colors for the three sheets. Also, the instructor should prepare transparencies of the instructions and a results sheet on a transparency that will be helpful after the experiment in communicating the results and stimulating the discussion. All
materials that we use for the experiment are available in the Appendixes.

The experiment is implemented as follows: First, distribute the instructions to all students and ask them to read them carefully and silently. Students need five to seven minutes for this. Second, after students have read the instructions, summarize the rules of the game by using the prepared transparencies and the overhead projector. After summarizing the rules, take questions. Third, ask the students to design their contracts now by filling out the contract design sheet of the owner. Students typically need five to seven minutes for this step. Fourth, collect all contract design sheets, and announce that all sheets will be shuffled and redistributed. Explain that all students will now act in the role of the expert. After shuffling the contract design sheets, distribute them along with the effort decision sheet of the expert. Before students make the decisions, summarize the rules for the expert’s decision with the help of a transparency. Emphasize that the experts have to insert the received contract (i.e., the contract stated in the contract design sheet of the owner) into the effort decision sheets of the expert. Then they must decide whether to accept the contract. In case of acceptance, they have to decide the effort level. Students need about three to five minutes to reach their decision. The whole experiment takes about 30 minutes, including distributing and recollecting decision sheets. A student may assist with a large class.

Because this is a teaching experiment that we use to illustrate some key concepts and to kick off discussions and convey some basic intuitions before the formal analysis starts, we see no need to pay students for their decisions (unlike in the scientific experiment that underlies this classroom experiment; see Anderhub, Gächter, and Königstein 2002). In our experience, incentives are not necessary for achieving the goals of this teaching experiment. Of course, other instructors may have different views on this. In this case, our experiment can be easily incentivized by paying (some randomly selected) subjects dependent on their decisions, either in money or course credit.

Another concern is that the experiment is played once and not repeatedly. It is hardly possible to repeat the experiment in a single class period of 45 minutes. However, if the instructor has more time or can implement the experiment in a computer laboratory, it can be easily repeated to learn about the impact of experience. See Anderhub, Gächter, and Königstein (2002) for the role of experience in this game.

CLASSROOM DISCUSSION

After collecting the agent’s decision sheets, ask one or two students to list them on the prepared transparencies (see the Appendixes). We found it useful to present the results in two ways. The first results sheet (Offered Contracts and Effort Levels, Appendix C) lists the offered contracts and the chosen effort levels. The second results sheet (Optimal Effort Choice?, Appendix C) summarizes the actual effort choices according to the best-reply effort levels. These transparencies are helpful in the formal part of the discussion.

We always find it useful to kick off the discussion informally. That is, while
the teaching assistant prepares the results, ask the students for their opinion on this experiment. Usually students are happy to give their impressions. Then proceed to ask questions such as “How did you come up with a contract in the first part?” “What kind of considerations did you have in mind?” and “In the second part, when you were an expert, how did you decide?” Most likely, this part of the discussion will reveal that the students quickly got the rules but found it tricky to think about an optimal contract design. This is natural given that the optimal contract design requires some anticipation of how the expert is going to behave. Thus, students find it easier to decide on the effort level rather than on the contract. By the time that some students have made statements, the assistant will be ready with the results, and students will be curious to learn about them. We first put up the results sheet with the offered contracts.

A typical result is that many owners ask for a return share of 50 percent and pay a positive fixed wage. Usually, about 10–20 percent of the contracts specify return shares larger than 80 percent, and few contracts offer only a fixed wage. Thus, students recognize the necessity to set incentives by offering a return share. There are a few contracts that ask for a negative fixed payment (typically those that offered a return share of 100 percent). When students are asked why they did not stipulate a negative fixed wage and offered only 50 percent as a return share, many argue that they do not want to share ownership because they feel entitled to ownership.

When students decide in the role of the expert, they often reject contracts (between 30 and 40 percent). Stated reasons for rejections often relate to the unfairness of the contract. The average effort level is usually between 5 and 6.

Putting up the results satisfies the students’ curiosity and further stimulates the discussion. Some of them say that they did not think about the expert’s likely effort level when they decided about the contract. Rather, they just thought about how, in their opinion, a reasonable contract looks. In other words, they did not think strategically. However, others think about the expert’s likely reaction and design their contract accordingly. In the role of the expert, they reject contracts they view as unfair, and if they accept the contract, they use a diversity of rules to decide on the effort level.

After this informal discussion, which we always find to be lively, the ground is prepared for a more formal discussion. Students are eager to learn about the correct solution to this problem. A good starting point is putting up a depiction of the earnings and cost schedule (see Figure 1).

Figure 1 makes it clear that the pie is largest at the effort level 10. The question is how to implement effort level 10. Before embarking on this question, it is useful to discuss the schedules first. Although students quickly understand that earnings increase with effort, some of them do not have an immediate intuition of the cost schedule being convex. It can be used to drive the idea home that incentive theory is about any productive activity that agents (i.e., experts) do not want to pursue at the margin (e.g., working long hours and thereby forgoing the opportunity to watch a movie or to spend the evening with a friend). If time is available, the instructor can also use this to discuss theories of work motivation (e.g., working for money vs. job satisfaction and self-fulfillment).

The next step in the discussion is the question of how to achieve effort level
Before going into the derivation of the optimal result, it is useful to start with a discussion of incomplete contracts. If the principal (i.e., owner) could enforce a contract that stipulates a particular effort level, there would not be any need for an incentive contract. As Milgrom and Roberts (1992, 127) stated, “Motivation problems arise only because some plans cannot be described in a complete, enforceable contract.”

The search for the optimal contract in this experiment starts with an argument on backward induction. The principal has to think about the agent’s reaction to a contract. By assuming that the agent wants to maximize his monetary income, the analysis can begin. Students usually remember that the marginal benefit equals marginal cost principle of optimal choice. In this setup, the total marginal benefit from effort is constant and equals 70. The fixed payment is independent of the effort level and therefore does not influence the marginal benefit. The marginal benefit that belongs to the agent is determined by the earnings share. If the earnings share is zero, the marginal earnings for the agent is zero, but the marginal cost is always positive. Thus, an optimizing agent will always shirk (i.e., in this case, work at the lowest effort level). Incentives are needed to prevent shirking. The opposite case occurs when the earnings share is 100 percent. In this case, the agent can pocket the entire return. A comparison of marginal cost and

FIGURE 1. Earnings and costs.
benefit quickly reveals that marginal cost is at most 50, but the marginal return is always 70. Thus, an agent who enjoys the full fruits of his labor has an incentive to work at the highest effort level. At this point, students probably realize that an earnings share of 80 percent already suffices to induce full effort of an optimizing agent.

Figure 2 reveals that depending on the earnings share provided in the contract, only five effort levels can be optimal from the agent’s perspective—levels 1, 4, 6, 8, and 10. Thus, economic theory predicts a positive correlation between earnings share and effort level. When designing a contract, the principal has to take this constraint into account. In the terminology of principal-agent theory, this is called an incentive compatibility constraint (see Figure 2).

A principal who understands the problem of shirking and the logic of the incentive compatibility constraint will therefore offer a contract that gives the agent at least an earnings share of 80 percent. Because this earnings share induces an optimizing agent to provide the largest effort, the surplus will be maximized and amount to 400 (see Figure 1). Provided the agent is a money maximizer, the principal will ask for a fixed payment of –299 because this is sufficient to grant that the agent accepts the contract. Namely, the agent, who earns 100 if he rejects the contract, enjoys a net earning of one money unit and will consequently accept the contract. That the principal has to grant the agent’s participation is called a

![FIGURE 2. Deriving the solution with marginal benefits, by percentage. Optimal solutions include effort levels 1, 4, 6, 8, and 10.](image)
participation constraint in principal-agent theory.

The data do not conform to this prediction. Agents who receive a contract with a low share of the overall surplus are likely to reject it. In this regard, the results are similar to those of the well-known ultimatum game. Thus, the instructor can drive home the point that the relevant participation constraint of the agent is not just his outside option but what the agent is willing to accept.

The effort choices of accepted contracts conform, by and large, to economic theory. The correlation between earnings share and actual effort level is usually highly significantly positive. This message can be effectively conveyed using the second results sheet (Optimal Effort Choice?, Appendix C). Students usually are impressed.

This theoretical discussion, combined with the results, can be helpful to the students for getting the economic logic right. The instructor can discuss the theoretical properties of fixed and variable payments, the importance of outside options, and the participation and incentive compatibility constraints. However, the instructor can also discuss the relevance of equal sharing and reciprocity in contracting. As in many other experiments, we usually observe some students who reject unequal contracts or choose a suboptimal effort level. Thus, if time allows, the instructor can also briefly relate recent results in related experimental games.

This experiment can also be used to discuss the economic concept of efficiency. Students easily see where the pie is maximized. They also understand that if the pie is not yet maximized, there are arrangements where a least one party can be made better off without making the other one worse off. From the concept of efficiency, it is a small step toward the efficiency principle, value maximization, and the Coase theorem as discussed, for example, by Milgrom and Roberts (1992). We therefore usually assign chapter 2 in Milgrom and Roberts (1992) as compulsory reading and ask the students in a homework assignment to relate these concepts to the classroom experiment.

ADDING ASYMMETRIC INFORMATION

In our experiment, there is no asymmetric information and the principal’s earnings is deterministic in the agent’s effort because we want to focus on contractual incompleteness and profit sharing as a simple solution of incentive contracting in this case. However, the experiment can be adapted to incorporate asymmetric information and stochastic earnings. We present an easy solution: Introduce two earnings (e.g., a large earning of 700 and a low earning of 70). The choice of effort now becomes a choice of probability for the high earnings and low earnings, with effort level 1 representing a probability of 10 percent for the high return (90 percent for low return). Accordingly, effort level 2 represents a probability of 20 percent for high earnings and so forth. Effort level 10 (i.e., the probability of the large earning is 100 percent) should be excluded. This procedure ensures that the returns are always stochastic and the principal only observes an outcome and not the actual effort level. Of course, the instructions and results sheets need to be adapted accordingly.

Given these changes in the experimental setup, the players’ risk preferences
become important for determining a theoretical solution. If the agent is risk neutral, the optimal contract still requires an earnings share of at least 80 percent, and the first best is achieved. If players are risk averse, the optimal contract depends on the exact specification of preferences and may be inefficient.

Thus, the stochastic version of our experimental game sets the stage for teaching students issues of agency cost and the tradeoff between provision of work incentives and insurance. However, determining the optimal solution in this case could be technically demanding. In addition, because the risk preferences of students are heterogeneous and unknown, the experimenter has to consider the problem of inducing or eliciting these preferences in the classroom.\(^\text{10}\)

**FURTHER READING**

To our knowledge, our experiment is the only one that looks at contractual incompleteness and profit sharing. The teaching experiment of Ortmann and Colander (1997) is based on the prisoner’s dilemma and designed to illustrate the issue of moral hazard. Douglas (1989) proposed a simple analytical approach and Zhou (2002) a graphical approach of teaching the principal-agent problem with asymmetric information. Keser and Willinger (2000) presented a research experiment on a standard principal-agent problem with agency costs.


The experimental design of the present teaching experiment is inspired by research articles with which we were involved (Anderhub, Gächter, and Königstein 2002; Güth et al. 1998; Königstein 2001). Anderhub, Gächter, and Königstein (2002) provided references for additional principal-agent experiments. This article can also be recommended to those students who want to learn more about this experiment.

The design of this classroom experiment is closest to that of Anderhub, Gächter, and Königstein (2002). The most important design differences are that in Anderhub, Gächter, and Königstein (2002), agents can choose among 21 effort levels, and the return shares are multiples of 1 percent. Moreover, the game is played repeatedly, in two sequences of six periods each. The results are that principals design work contracts that are incentive compatible and obey the participation constraint. Contracts are less unequal than predicted by standard arguments. Agents reject unequal contracts (as in the ultimatum game) and respond to a very large degree optimally to the incentives set by the contract. Deviations from the optimal contract are consistent with reciprocity. In summary, the results typically observed in this classroom experiment are largely consistent with the observations in the underlying research experiment.

**NOTES**

1. Our model is not a standard agency model in which asymmetric information (i.e., lack of observability of effort) and the agent’s risk aversion imply agency costs. Yet, as in the standard agency model, in our experiment, effort is not directly contractible. Therefore, a simple fixed wage
contract does not align interests between principal and agent. However, our experiment can be extended by adding asymmetric information. We illustrate and discuss this possibility in the Adding Asymmetric Information section.

2. Contracts in reality that resemble our model include franchising (Mathewson and Winter 1985) and contracts between authors and publishers or between actors and producers (see Chisholm 1997).

3. With our parameters, return shares of 80–100 percent induce efficiency. Offering 100 percent is the trembling-hand perfect solution (see Anderhub, Gächter, and Königstein 2002).

4. The instructions we use can be downloaded at http://www.nottingham.ac.uk/%7Elezsg1/personalpage.htm. They are written in Microsoft Word in 20-point font size. This has the following two advantages: First, the instructor can print the instructions on one piece of paper by using the option of printing four pages on one page. Second, the instructor can also print the same set of instructions on transparencies, which are very helpful in summarizing the basic rules.

5. We have developed a computerized version of our experiment (called “design_a_contract.ztt”). The program allows the instructor to run as many rounds as he or she wants. Our program runs under the experimental software z-Tree (Fischbacher 2007). z-Tree is a popular and easy-to-use toolbox for economic experiments, does not require any programming skills, and is freely available (see http://www.iew.unizh.ch/ztree/index.php). z-Tree must be installed first before our program can be used. Fischbacher (2007) provides the necessary background and details. z-Tree runs with Windows NT, 2000, XP, and Vista but not Windows 98. The program “design_a_contract.ztt” can be downloaded for free at http://www.nottingham.ac.uk/%7Elezsg1/personalpage.htm.

6. Effort level 1 is optimal for earnings shares 0, 10, and 20 percent; effort level 4 is optimal for earnings shares of 30 and 40 percent; effort level 6 is best for the earnings share of 50 percent; level 8 is a best response for the earnings shares of 60 and 70 percent; and earnings shares larger than 70 percent induce the highest level. Thus, in our experiment, the first-best effort level can be achieved. Notice that these predictions do not rely on assumptions of the agent’s risk preferences as no risk is involved.


8. Camerer (2003) provided an extensive overview of experimental results in related games. Dickinson (2002) presented a classroom bargaining experiment designed for discussing fairness issues. Fehr and Gächter (2000) surveyed experimental results on fairness and reciprocity and argued for their importance in various contracting situations. Rigdon (2002) challenged the robustness of reciprocity in experimental labor relationships if costs of effort and the anonymity between subject and experimenter increase. List (2006) provided evidence for reciprocity in a laboratory experiment but found little evidence for reciprocity in a field experimental context. Kagel, Kim, and Moser (1996) analyzed the roles of asymmetric information and asymmetric payoffs in surplus sharing and showed that behavior is strongly affected by these variables. Thus, our experiment can serve as a starting point for a discussion about the role of fairness and reciprocity and their relevance in labor relationships.

9. Our proposal follows an experiment by Kuhlmann (2006) who applied a similar procedure to the gift-exchange game without profit sharing. We are grateful to a referee who made a similar suggestion.

10. See Holt (2006) for experiments on eliciting risk preferences and Berg et al. (1986) for techniques to induce risk preferences.

REFERENCES


APPENDIX A
INSTRUCTIONS FOR DESIGN A CONTRACT EXERCISE

1. Imagine you are the owner of a firm but you lack the expertise to run your
   company properly. Therefore, you decide to hire an expert.
2. Your task is to design a contract between you and the expert.
3. The expert can accept or reject your proposal. If the expert rejects the
   proposal, he will earn 100; you will earn nothing.
4. If the expert accepts the contract and is therefore willing to run your company,
   he or she chooses his or her work effort. For simplicity, we assume that there
   are 10 work effort levels the expert can choose, ranging from 1 (expert works
   very little) to 10 (expert works very hard).
5. The work effort determines the total earnings that are generated as a result
   of the expert’s work effort. The higher the expert’s work effort, the higher the
   total earnings but also the higher the cost the expert has to bear.

Your contract offer to the expert consists of two elements:
1. A fixed payment, which can be
   - positive (i.e., the expert gets a salary)
   - or negative (i.e., the expert has to pay this amount to you).
2. The expert’s earnings share, in multiples of 10 percent, states the share of
   the total earnings (in percent) that belongs to the expert (the rest automatically
   goes to you).

Rules for Contract Offers to the Expert

For contract offers, the following rules hold:
-700 ≤ fixed payment ≤ 700 (only integers)
The expert’s earnings share: Between 0 and 100 percent (in 10 percent
   increments; 0 percent, 10 percent, . . .)
   All combinations that obey these rules are feasible.

For payoffs, if the expert accepts the contract:
The expert gets: [expert’s earnings share in percent] × (total earnings) + fixed
   payment – cost of the expert’s work effort
The owner gets: [100 percent – expert’s earnings share in percent] × (total
   earnings) – fixed payment

For payoffs, if the expert rejects the contract:
The expert earns 100.
The owner earns 0.

Note. The expert’s return share is a multiple of 10 percent (0 to 100 percent).
- Example 1: Expert’s earnings share = 0 percent ⇒ the owner gets
   the whole earnings.
- Example 2: Expert’s earnings share = 100 percent ⇒ expert gets the
   whole earnings.
- Example 3: Expert’s earnings share = 50 percent ⇒ expert gets 50
   percent; owner gets 50 percent of earnings.

(appendix continues)
## APPENDIX A (Cont.)
### WORK EFFORT LEVELS AND TOTAL EARNINGS

<table>
<thead>
<tr>
<th>Expert’s work effort (1 = lowest)</th>
<th>Total earnings from expert’s effort (70 × work effort)</th>
<th>Costs of work effort for expert</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>140</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>210</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>280</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>350</td>
<td>90</td>
</tr>
<tr>
<td>6</td>
<td>420</td>
<td>120</td>
</tr>
<tr>
<td>7</td>
<td>490</td>
<td>160</td>
</tr>
<tr>
<td>8</td>
<td>560</td>
<td>200</td>
</tr>
<tr>
<td>9</td>
<td>630</td>
<td>250</td>
</tr>
<tr>
<td>10</td>
<td>700</td>
<td>300</td>
</tr>
</tbody>
</table>

*Note.* Table indicates the relation between the expert’s work effort and the generated total earnings from his or her work effort. The table also shows the costs of work effort the expert has to bear.

**Example:**

You offer the following contract:

- Fixed payment: +55
- Expert’s earnings share: 50 percent

The expert chooses effort level 3. Therefore, the total earnings are 210.

The expert earns: \(50\% \times 210 + 55 - 40 = 120\).

You earn: \(50\% \times 210 - 55 = 50\).

You can simulate payoff consequences of various contracts by using assumptions on the expert’s work effort.
### Contract Design Sheet for the Owner

I make the following contract proposal to the expert:

- **Fixed payment** (between -700 and +700):
  - [ ] _________

- **Expert’s earnings share** (multiples of 10 percent, between 0 and 100 percent):
  - [ ] _________

### Effort Decision Sheet for the Expert

*Now you are an expert!* You have just received a contract offer. You now have to make two decisions:

1. Your first decision is to decide whether you **accept** or **reject** this contract.
2. If you accept the contract, you have to choose your **work effort**.
3. Please fill in the details of the contract proposal that you have just received from an owner:
   - **The owner’s proposed fixed payment for me:** [ ] _________
   - **The owner’s proposed earnings share for me:** [ ] _________

I accept this offer:

- [ ] No
- [ ] Yes

*Only when “Yes”: I choose the work effort level (between 0 and 10):*
  - [ ] _________
### APPENDIX C
### RESULTS SHEETS

#### First Results Sheet (Offered Contracts and Effort Levels)

<table>
<thead>
<tr>
<th>Number</th>
<th>Fixed payment</th>
<th>Earnings share percent</th>
<th>Accept (1 = yes; 0 = no)</th>
<th>Effort level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Second Results Sheet (Optimal Effort Choice?)

<table>
<thead>
<tr>
<th>Earnings share percent</th>
<th>Payoff maximizing effort</th>
<th>Actual efforts</th>
<th>Average effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, 10, 20</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30, 40</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60, 70</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80, 90, 100</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Copyright of Journal of Economic Education is the property of Heldref Publications and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.