RESPONSIBILITY-ALLEVIATION AND EFFORT PROVISION IN A GIFT-EXCHANGE EXPERIMENT*

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Abstract: Previous indirect evidence suggests that impulses towards pro-social behavior are diminished when an external authority is responsible for an outcome. The *responsibility-alleviation* effect states that a shift of responsibility to an external authority dampens internal impulses toward honesty, loyalty, or generosity. In a gift-exchange experiment, we find that subjects respond with more generosity (higher effort) when a wage is determined by a random process than when it is assigned by a third party, indicating that even a slight shift in perceived responsibility for the final payoffs can change behavior. Responsibility-alleviation is a factor in economic environments featuring substantial personal interaction.

1.INTRODUCTION

It is well-known that context and framing can affect decisions. This is particularly true when a decision is sensitive to social considerations and where norms for appropriate behavior are not clearly defined. One example from experimental economics is the dictator game, where one person in a mutually anonymous pair unilaterally chooses a binding allocation of a sum of money between the two members of the pair. Here the division selected is notoriously sensitive to such issues as the phrasing of the instructions and the sense of entitlement.[1] Kahneman, Knetsch, and Thaler (1986) present convincing evidence that one's view of an action's fairness depends on the context in which the action is chosen. Ross and Samuels (1991) perform a psychology experiment where the identical prisoner's dilemma game was played in two groups, but labeled "The Community Game," in one case and "The Wall St. Game" in the other. Players selected the cooperative action far more frequently in "The Community Game."

Social norms and fairness are probably most salient in environments featuring a high degree of interpersonal interaction (e.g., employment relationships, bargaining, and dispute resolution); in these realms, perceptions of the relevant social norms may well affect individual behavior. There are studies in the fields of psychology, management, and education which suggest that an individual with a greater degree of responsibility for an outcome tends to respond with more socially-efficient behavior. A common thread is that one seems less bound by concerns such as honor or duty when one believes that another party is responsible for making a ruling or enforcing a policy. In a sense, the intervention of a determinative external authority alters the context and shifts the focus away from self-reputation, substituting extrinsic for intrinsic motivation.[2] The presence of external

[1]Hoffman, McCabe, and Smith (1996) offer some nice illustrations of the sensitivity of offers in the dictator game.

[2]By self-reputation, I mean that an individual may have a self-image which can be affected by one's actions; to the extent that one derives positive utility from a positive self-image, self-reputation can act as a constraint on behavior. Deci and Ryan (1985) and Lepper, Greene, and Nisbett (1973)

authority shifts the decision focus to the likelihood of observation and the consequences of detection, rather than questions of social responsibility. Let us call this effect *responsibility-alleviation*; in many situations, shifting responsibility to an external authority dampens internal impulses toward honesty, loyalty, or generosity.[3]

For an example to clarify the intuition, consider the phenomenon of the "trapped-fly ball" in baseball.[4] Suppose that an outfielder makes an attempt to catch a fly ball and knows: 1) the ball was trapped, and 2) the play can be observed only imperfectly by the other people present. If there is an umpire responsible for making the call, the fielder typically portrays this as a catch, in an attempt to deceive the official. However, if instead the outfielder has the responsibility for making the ruling, there may be a strong impulse to tell the truth. The implicit rules for appropriate behavior differ in the two cases: it is acceptable or even clever to fool the umpire, but dishonest to claim a catch when one is the final authority on the outcome.

There is indirect field evidence of responsibility-alleviation from studies involving employment relations, dispute resolution, and academic honesty. In dispute resolution, relationships, satisfaction, and compliance are highly affected by the resolution method selected. In employment relationships, there are often situations where effort is discretionary. In test-taking situations, students may be more honest when there is an honor system rather than proctoring (and students are responsible for their own levels of honesty). These results indicate that when another party is perceived to be responsible for allocations,

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discuss extrinsic vs. intrinsic motivation and find that if people are given extrinsic rewards for pursuing an activity, their existing intrinsic motivation is undermined.

[3]It is certainly true that not every individual can be persuaded to assume responsibility for results or determinations. Although there is sometimes a tendency to avoid responsibility and commitment, it is also true that many people do agree to take on the responsibility for an unpleasant task. One may have a sense of "duty" which acts as a motivation. A failure to heed this call may affect one's self-reputation, with a concomitant loss of personal utility. Kerr and MacCoun (1985) provide evidence that people will even consciously let others free ride on their efforts if they feel that their social role prescribes it.

[4] A fielder must catch a fly ball (a ball hit in the air) before it bounces to be successful. If the ball bounces just before it enters the fielder's glove, it is considered "trapped."

monitoring, or enforcement, the consequent levels of personal participation in the process and responsibility for an outcome substantially influence efficiency and performance.

While these field studies are valuable, there is also merit in testing this premise in a controlled laboratory environment featuring monetary payoffs based on decisions. I investigate responsibility-alleviation using the gift-exchange experiment presented in Charness (1998). Here employees are assigned wages by either an employer, a third party, or a random mechanism (bingo cage); we focus on comparisons between the latter two cases. Effort is costly to the employee, but higher voluntary effort greatly enhances the employer payoffs. When the wage is determined by an external process rather than a self-interested employee, higher effort represents generosity or a willingness to "share the wealth."

Although it is true that the responsibility for effort provision remains with the employee, the initial wage choice defines the set of possible payoffs. According to the principle of responsibility-alleviation, we should expect impulses toward generosity to be diminished if a third party has assigned the wage, as an employee may perceive this wage to be an entitlement rather than an accident. The human intervention may shift some responsibility for the determination of these payoffs. Conversely, a subject in the random treatment must accept full human responsibility for the final allocations. The results indicate a small but significant increase in effort provision when the wage is determined by a draw from a bingo cage. The effect is most pronounced with respect to high effort levels, as only 2% of effort choices were high (.8, .9, or 1.0) in the third-party case, compared to 11% in the random case. Overall, chi-square tests indicate the difference between treatments is significant at the 2% level.

It is difficult to credibly shift responsibility in an artificial laboratory environment, so the difference in effort levels may represent a lower bound on the magnitude of this effect. In any case, the level of costly effort provision is lower when a neutral human agent chooses the employee's wage and high levels of effort are much rarer. The resulting productivity is

higher when an employee cannot attribute any responsibility for his wage to a neutral third-party and is the only human influence on the ultimate allocation of payoffs between employer and employee.

The social welfare effects of responsibility-alleviation are greater when one considers dynamic outcomes, rather than one-shot static results. In a workplace, pro-social behavior can lead to improved relationships and increased productivity; in the educational realm, less cheating can lead to a greater respect for the learning process and increased scholarship; diminished adversarial behavior in disputes can effect a decrease over time in the number of disputes.

2. PREVIOUS THEORY AND EVIDENCE

There is no previous general formulation of responsibility-alleviation, but we can find many examples of behavior that support the premise. One relevant area is job performance. There is empirical evidence that people may resent the presence of a monitor, with job performance adversely affected. Griffith (1993) tested monitoring and job performance, finding that performance was lower with physical monitoring than with no monitoring, except when a supervisor is actively monitoring. Barkema (1992) provides evidence from managers in Dutch firms which suggests that executive performance is better without close supervision. Baker, Jensen, and Murphy (1988) stress the role of trust and loyalty. In the area of dispute resolution, arbitration studies in (e.g. Lester, 1989 and Currie and McConnell, 1991) indicate that placing the responsibility for a decision in the hands of a third party can adversely affect the negotiation process - the expectation of third-party intervention may lead to impasse more frequently than would otherwise occur. McEwen and Maiman (1984) find that defendants in small claims court in Maine were nearly twice as

likely to comply fully with mediated outcomes, as with judgments imposed by the court after adjudication.[5]

Evidence of a slightly different nature is found in studies of the honor system. A seminal work by Campbell (1935) compares the behavior of students under an honor system and a proctor system. He concludes (p. 72) that "The amount of classroom dishonesty ... was greater among the students working under the proctor system than among similar subjects working under the honor system." Students strongly favored the honor system and were also optimistic regarding the possibility of developing a high moral standard among college students. May and Loyd (1993) also support the conclusion that the existence of an honor code is associated with increased academic honesty.[6] In a similar vein, students in a Haines et al (1986) study felt that the honor system actually instilled honesty and integrity in students.

Some theoretical explanations have been advanced for these results. Akerlof and Yellen (1986) argue that workers may acquire sentiments toward the firm by which they are employed, so that behavior can be affected. Frey (1993) provides a model which illustrates how external intervention, in the form of high levels of monitoring, can negatively impact work performance when personal relationships are important.[7] Principal-agent theory presumes that the disciplining effect of monitoring has a beneficial effect on performance. However, in many work environments an implicit psychological contract exists between

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[5]In mediation, participants help shape the resolution and must consent to it; in arbitration, an outcome is imposed by a third party who hears the evidence. The authors take pains to minimize the problem of self-selection.

[6]An overall cheating measure used in this article shows 23.7% of the students cheating under an honor system versus 54.1% cheating with no honor system. The authors also suggest that a necessary ingredient is the internalization of the values espoused in the honor system.

[7]In this model, agents maximize utility by choosing optimal effort E*, given monitoring M and the resulting benefits B(E,M) and costs C(E,M). Differentiation of the optimality condition gives: $dE^*/dM = B_{EM} - C_{EM}/C_{EE} - B_{EE}$. By principal-agent theory, the disciplining effect would mean that $C_{EM} < 0$. The crowding-out effect would mean that $B_{EM} < 0$. The marginal cost of effort increases with effort ($C_{EE} > 0$), as does the marginal benefit from effort ($B_{EE} < 0$). The sign of dE^*/dM thus depends on the relative values of these derivatives; where the crowding-out effect is strong and the disciplining effect is weak, tighter monitoring reduces the agent's effort.

principal and agent, causing the agent to view intensive monitoring as evidence of distrust. This perceived distrust reduces the agent's marginal benefit from work effort and encourages more opportunistic behavior, as issues of self-reputation are alleviated and an agent's intrinsic motivation is reduced. Monitoring "crowds out" work effort, particularly when personal relationships are salient.

In the field of dispute resolution, MacCoun, Lind, and Tyler (1992) state that "legal procedures that rely on formal, adversary adjudication can damage ongoing relationships." Methods which promote cooperation in the resolution process may generate less hostility between the parties, preserving, and sometimes strengthening, relationships. This has clear implications for the likelihood and character of continuation disputes between these parties. Many studies (e.g., Thibaut and Walker, 1975 and Tyler, 1990) indicate that procedural satisfaction may be as important as outcome satisfaction. A satisfied party is more likely to maintain a positive, productive relationship with others in the environment, and to refrain from sabotage, physical violence, and other costly forms of passive or active rebellion. If parties with stakes in the outcome also have considerable responsibility for determining the outcome, process satisfaction is enhanced and resolution is more effective.

3. EXPERIMENTAL METHOD

The experiment involved a simulated labor market. Participants initially assembled in one room and were then randomly divided into groups of employers and employees and separated into two rooms. As in Fehr et al (1998), each employee was paired anonymously with one employer in each period (10 periods in all) and it was common knowledge that workers and firms were not re-matched with the same person.[8] A full description of the instructions and record sheets issued to the subjects is presented in Appendix A.

Employees were given a wage, which was assigned by either an employer, a third party, or an individual draw from a bingo cage. Each employee was in only one of these

[8] In general, there were ten employers and ten employees in each session.

three treatments. Once assigned a wage, each employee was asked to record an effort choice (between 0.1 and 1.0, inclusive) on a record sheet and to fold this sheet before turning it in to the experimenter. This sheet was then given to her employer in the other room. The combination of wage and effort determined outcomes and monetary payoffs for each pair of subjects in a period. Each employer was given an endowment of 120 "income coupons" in each period. The employer's payoff function was given by:

$$\Pi_F = (120 - w)*e \qquad (1)$$

where e denotes the employee's effort and w the wage. The payoff function for an employee was defined as:

$$\Pi_E = w - c(e) - 20 \qquad (2)$$

where c(e) is the cost of effort, a function increasing in e. The minimum effort level of 0.1 had zero cost. These payoff functions and the values of the parameters were common knowledge.[9]

This paper considers only the results when wages were selected by either a random mechanism or a third party. For the random case, the data from the employer-determined case was used to create a mapping of wages onto the numbers of balls in a bingo cage. For each subject in each period, a ball was drawn from the bingo cage and the employee was told the wage. In the third-party condition, these draws were reproduced (subject to production flaws). Subjects were informed by the experimenter that wages had been pre-selected by a third party (the experimenter) for each subject number for each period and wages were assigned individually. In a certain sense, the exogenously-determined wage cases are analogous to a dictator game, since one party has no choice of actions, but is completely dependent on the other player for her payoff. Having all participants meet in one room at the outset helped to ensure that another real person's payoffs were credibly dependent on the employee's action choice.

[9]Experimental "guilders" were converted to dollars at the rate of 25 guilders = $1.

4. RESULTS

The full results are shown in Appendix B. If the perception that a neutral person determines the wage causes an employee to feel less responsible for the employer's payoff, the principle of responsibility-alleviation predicts that employees will provide more costly effort when a wage has been randomly determined than when this same wage is determined by a human third party. This hypothesis can be tested using both nonparametric methods (see Siegel and Castellan, 1988) and regressions with a treatment parameter. As the assigned wages in the two treatments are nearly the same (the mean wage was 57.0 in the random treatment and 57.9 in the third-party case), we can compare effort provision levels[10] in the treatments with the Chi-square test:

TABLE 1

Treatment	**Effort**									
	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0
Random	70	22	22	21	16	8	10	7	4	10
3rd-party	77	13	25	26	28	12	15	1	2	1

The test statistic is $\chi^2 = 20.6$ (d.f.=9), so that the null hypothesis of no difference can be rejected at p = .02. We can also reduce the number of effort categories to low (.1,.2, or .3), medium (.4,.5, .6, or .7) or high (.8,.9,1.0), producing the results below:

TABLE 2

Treatment	**Effort**		
	Low	Medium	High
Random	114	55	21

[10] In Charness (1998), effort/wage slopes are compared for these treatments and found to be very similar. Here we look at levels of effort and find a significant difference.

3rd-party	115	81	4

Here we have χ^2 = 16.3 (d.f.=2), so that the null hypothesis of no difference can be rejected at p = .01. The most dramatic difference between the treatments is that high effort provision is far more common with random wage determination.

The experimental design permits direct point-by-point comparison of the effort choices made by employees in the random and third party treatments, since the wages assigned to an employee in one treatment were identical (in sequence, as well) to those assigned to a corresponding employee in the other. If the wage-generating mechanism has no substantial effect on the effort choice, we should expect the number of instances where the effort level selected in the random case exceeds that chosen in the corresponding third party case to be approximately equal to the number of instances where the reverse is observed. Let N_r be the number of observational pairs where the effort chosen in the random case exceeds that chosen in the third party case and N_t be the number of cases where the reverse is true. The data show that N_r = 82 and N_t = 62, while the chosen effort level was identical in 36 cases.[11] Using the normal approximation to the binomial distribution, we can reject the null hypothesis that $N_t \geq N_r$.[12]

The simplest comparison is between the mean effort levels for each treatment. These are .3463 and .3220 for the random and third-party cases, respectively. However, as average wages differ slightly across conditions (higher average wages in the random case), a better measure is the ratio of discretionary effort (effort - .1) to discretionary wage (wage -

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[11] Although in principle there should be 190 joint observations of effort levels chosen (19 employees x 10 periods), due to some production errors there are only 180 precise matches.

[12] My alternative hypothesis is that $N_r > N_t$.

20). Overall, this ratio is 14% higher in the random treatment (.00666 to .00586). For individual observations, this ratio is well-defined when wage > 20. If we eliminate the 37 (of 390) observations where w = 20, we have the following OLS regression:

$$\textbf{RATIO} = \textbf{.00596} + \textbf{.00191}*\textbf{RANDOM}$$
$$(6.81) \qquad (1.51)$$

353 observations R^2 =.0064

The numbers in parentheses are the t-statistics. The coefficient for the random dummy is only marginally significant (p = .065), but is more than 30% the value of the constant term.

Thus, it appears that people feel less of an impulse to contribute to the welfare of an anonymous employer when a third party is perceived to have in some way approved the wage, shifting some of the responsibility for determining final outcomes. As might be expected, this is a somewhat subtle effect. Yet the occasional impulses towards high levels of generosity (effort) seen in the bingo-cage treatment all but disappear when a 3rd party has assigned the wage.

5. CONCLUSION

We have seen that the issue of responsibility can be an important determinant in an individual's choice of actions. Third-party intervention appears to have a slight, but definite, negative effect on the effort levels chosen by employees. This effect is not induced by strategic expectations of a party's presumed ability to affect the third party decision,[13] but reflects a difference in employee generosity, perhaps induced by a disparity in relative payoffs. As in Kahneman, Knetsch, and Thaler (1986), an identical action (a wage)

[13] This contrasts with the "chilling effect" (parties' expressed positions diverge, hindering settlement) in arbitration, which is induced by beliefs that the third party will tend to "split-the-difference" between positions.

produces differing responses (effort levels) depending on the context in which it is viewed. This context may affect perceptions of applicable social norms and beliefs about appropriate behavior. Similarly, self-regulation and personal participation may lead to more socially-beneficial outcomes in other environments.

The experimental results indicate that, in general, one is more generous with an anonymous stranger when one must assume full human responsibility for an allocation of payoffs. When an external and neutral party has at least some responsibility for the final outcome, the parties directly involved tend to be less concerned about the well-being of others. Third party intervention may be helpful in many situations, but if people are less generous and/or more partisan when a third party is perceived to have some responsibility for allocations and payoffs, there can be a high social cost from such intervention.

The responsibility-alleviation effect can have major consequences for the design of employment environments and dispute resolution processes. As relationships are important in the labor context, enhancing cooperative behavior and loyalty is clearly beneficial. While benefits of enhanced pro-social behavior can be substantial in the static case, the potential impact potential is greater in a dynamic context, particularly in economic environments featuring repeated personal interaction. There are implications for management in the workplace, for the design of dispute resolution systems, and for educational testing policies. Further experimental research would help delineate the scope of this effect.

REFERENCES

Akerlof, G. and J. Yellen, eds., Efficiency Wages Models of the Labor Market, 1986

Baker, G., M. Jensen, and K. Murphy, "Compensation and Incentives: Practice versus Theory," Journal of Finance, 1988, 593-616

Campbell, W., A Comparative Investigation of the Behavior of Students Under an Honor System and a Proctor System in the Same University. 1935

Charness, G., "Attribution and Reciprocity in a Simulated Labor Market: An Experimental Investigation," Universitat Pompeu Fabra Working Paper, 1998

Currie, J., and S. McConnell, "Collective Bargaining in the Public Sector: The Effect of Legal Structure on Dispute Costs and Wages," American Economic Review, 1991, **81**, 693-718

Deci, E. and R. Ryan, Intrinsic Motivation and Self-Determination in Human Behavior, 1985, New York, Plenum Press

Fehr, E., E. Kirchler, A. Weichbold, and S. Gachter, "When Social Forces Overpower Competition: Gift Exchange in Experimental Labor Markets," Journal of Labor Economics, 1998, **16**, 324-351

Frey, B., "Does Monitoring Increase Work Effort? The Rivalry with Trust and Loyalty," Economic Inquiry, 1993, **31**, 663-670

Barkema, H., "Do Job Executives Work Harder When They are Monitored? Evidence from the Netherlands," 1992, mimeo, University of Tilburg

Griffith, T., "Monitoring and Performance: A Comparison of Computer and Supervisor Monitoring," Journal of Applied Social Psychology, 1993, **23**, 549-572.

Haines, V., G. Diekhoff, E. LaBeff, and R. Clark, "College Cheating: Immaturity, Lack of Commitment, and the Neutralizing Attitude," Research in Higher Education, 1986, **25**, 342-354

Hoffman, E., K. McCabe, and V. Smith, "Social Distance and Other-Regarding Behavior in Dictator Games," 1996, American Economic Review, 1996, **86**, 653-660

Kahneman, D., J. Knetsch, and R. Thaler, "Fairness as a Constraint on Profit-Seeking: Entitlements in the Market," American Economic Review, 1986, **76**, 728-741

Kerr, N. and R. MacCoun, "Role Expectations in Social Dilemmas: Sex Roles and Task Motivation in Groups," Journal of Personality and Social Psychology, 1985, **49**, 1547-1566

Lepper, M., D. Greene, and R. Nisbett, "Undermining Children's Intrinsic Interest with Extrinsic Rewards: A Test of the Overjustification Process," Journal of Personality and Social Psychology, 1973, **23**, 129-137

Lester, Richard, "Analysis of Experience under New Jersey's Flexible Arbitration System," Arbitration Journal, 1989, **44**, 14-21

MacCoun, R., E. Lind, and T. Tyler, "Alternative Dispute Resolution in Trial and Appellate Courts," in Handbook of Psychology and Law, 1992, D. Kagehiro and W. Laufer, eds., 95-118

May, K. and B. Loyd, "Academic Dishonesty: The Honor System and Students' Attitudes," Journal of College Student Development, 1993, **34**, 125-129.

McEwen, C. and R. Maiman, "Mediation in Small Claims Court: Achieving Compliance through Consent," Law and Society Review, 1984, **18**, 11-49.

Ross, L. and G. Samuels, "Player Reputation vs. Name of the Game: Effects of Construal in the Prisoner's Dilemma," Unpublished manuscript, Stanford University, 1991

Siegel, S. and N. Castellan, Non-Parametric Statistics for the Behavioral Sciences, 1988

Thibaut, J. and L. Walker, Procedural Justice: A Psychological Analysis, 1975

Tyler, T, Why People Obey the Law; Procedural Justice, Legitimacy, and Compliance. 1990

APPENDIX A: EXPERIMENTAL INSTRUCTIONS

You are an employee

GENERAL INFORMATION FOR EMPLOYEES

You will be taking part in a study of the labor market. This research is being funded by the Vice Chancellor for Research at UC - Berkeley. If you read these instructions carefully, you may earn a significant sum of money. During the experiment your income will be calculated in Guilders. At the end of the experiment, Guilders will be converted into dollars at the rate of:

25 Guilders = $1

You will also receive a $5 payment for showing up for the experiment on time. At the end of the experiment your income will be paid to you in cash.

Stage 1: Each of the participants will be randomly assigned to one of two groups: half will be "employees" and half will be "employers". This is known by each participant. Whether you are an employer or an employee is noted at the top right hand corner of this page. [**Employer-generated wages:** At the first stage employers offer employees wages. **Randomly-generated wages:** At the first stage employees will be offered wages. These wage offers will be randomly determined by draws from a bingo cage. **Third-party generated wages:** At the first stage employees will be offered wages. These wage offers are determined by a neutral third-party.] Employees must accept a wage offer, which must be at least 20 Coupons. After 3 minutes the second stage begins.

Stage 2: At the second stage, each employee makes a decision. According to the procedure described below, they determine how much they work (quantity or amount of work).

Attached to these instructions you will find decision-sheets on which you must record the wage. Furthermore, you will record the amount of work which you have chosen. After this you will calculate the income you have earned. At this point the first period of the labor market will be over. Overall, there will be ten periods in this experiment. You will generally be matched exactly once with each person in the employer group. You will never be matched with the same person in successive periods. Further, you will not know with whom you have been matched in any of the periods. Your total income for the participation in this market will be the sum of the earnings in each of the ten periods.

How the Labor Market Works

1. At the beginning of each period we will open the labor market. In the first stage of the labor market each employer may offer a wage to an employee. This employee must accept this wage offer, forming a labor contract with the employer.

2. You must **immediately record the wage on the decision sheet for that period**.

3. You will have travel costs of 20 Guilders, which are subtracted from your wage..

4. **No employer will know with which employee s/he has concluded a contract, and no employer will know the employee**.

5. After all wage offers are collected, the second stage begins. After seeing a wage offer, you must now choose a quantity of work. We will then relay your chosen quantity of work to your employer. Please do not tell anyone what quantity of work you chose. No other employee and no other employer will be informed about your chosen quantity of work.

How do you Calculate Your Income in Each Period?

1. You will receive the wage you have accepted. From this wage you must then subtract the travel costs and the costs of your amount of work.

2. You determine your quantity of work by choosing a number between 0.1 and 1.0 from the schedule below. The lowest amount of work you can choose is 0.1, 0.2 is a slightly higher amount, and so on up to 1.0, the highest amount.

3. The higher the quantity of work you choose, the better it is for your employer. The higher the number you choose, that is, the quantity of work, the higher "your" employer's income.

4. The higher the amount of work you choose the higher your work related costs will be. You can find out how these costs are related to quantity of work by looking in the schedule below.

5. Your income in Guilders will be determined by the following formula:

Income(4) = Wage(1) - Costs of Quantity of Work(2) - Travel Costs(3)

Schedule of feasible amounts of work (AW) and corresponding
work related costs to employees (COST)

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

How do you Calculate the Income of Your Employer in Each Period?

1. Each employer receives from the experimenter 120 coupons which he may use to pay for wages. If s/he offers you a wage of 120 Guilders, then s/he will have no income coupons left. If s/he offers you a wage of 20 Guilders then s/he will have 100 income coupons left. In general, your employer will have

120 coupons - wage

income coupons left.

2. How are the remaining coupons converted into Guilders? The number of coupons retained by the employer, whose wage offer you accepted, is multiplied by the quantity of work you choose. This result is the income of your employer in Guilders. Thus:

Employer's Income in Guilders = Coupons Retained x Quantity of Work

Please Note: The income of all employees and employers will be computed according to the same rules. Every employer has 120 Coupons and the work related cost-schedule as well as the travel costs are the same for every employee. Every employer is able to compute the income of "his" or "her" employee, and every employee is able to compute the income of "his" or "her" employer.

Let's Have an Exercise

1. Let's assume that an employer, who has 120 Coupons, offers a wage of 110 Guilders, which you accept. At the second stage of this period you choose a quantity of work of 0.5.

What will your income and the income of your employer be?

My Income = ... Guilders

Employer's Income = ... Guilders

2. Let's assume that an employer, who has 120 Coupons, offers a wage of 28 Guilders, which you accept. At the second stage of this period you choose a quantity of work of 0.6.

What will your income and the income of your employer be?

My Income = ... Guilders

Employer's Income = ... Guilders

3. Now let's assume again that an employer, who has 120 Coupons, offers a wage of 28 Guilders, which you accept. However, suppose that at the second stage of this period you now choose a quantity of work of 0.1.

What will your income and the income of your employer be?

My Income = ... Guilders

Employer's Income = ... Guilders

Schedule of feasible amounts of work (AW) and corresponding work related costs to employees (COST)

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

Employee Number:

Period Number:

Wage (1)	.....
Amount of Work Chosen	.....
Cost of Amount of Work Chosen (2)	.....
Travel Costs (3)	20 Guilders
Your Income in Guilders (4)	..... Guilders

Employer's Income in Guilders = (120 Coupons - Wage) x Amount of Work Chosen

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Employees will choose one of the feasible amounts of work (AW) from the first row. The higher the number, the higher the amount of work.

The second row of the schedule shows the cost of each amount of work (COST) for the employee. The higher the amount of work, the higher the costs to the employee.

Schedule of feasible amounts of work (AW) and corresponding work related costs to employees (COST)

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

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25 Guilders = $1

You will also receive a $5 payment for showing up for the experiment on time. At the end of the experiment your income will be paid to you in cash.

Stage 1: Each of the participants will be randomly assigned to one of two groups: half will be "employees" and half will be "employers". This is known by each participant. Whether you are an employer or an employee is noted at the top right hand corner of this page. [**Employer-generated wages:** At the first stage employers offer employees wages. **Randomly-generated wages:** At the first stage employees will be offered wages. These wage offers will be randomly determined by draws from a bingo cage. **Third-party generated wages:** At the first stage employees will be offered wages. These wage offers are determined by a neutral third-party.] Employees must accept a wage offer, which must be at least 20 Coupons. After 3 minutes the second stage begins.

Stage 2: At the second stage, each employee makes a decision. According to the procedure described below, they determine how much they work (quantity or amount of work).

Attached to these instructions you will find decision-sheets on which you must record the wage you have offered. Furthermore, you will record the amount of work that the employee has chosen. After this you will calculate the income you have earned. At this point the first period of the labor market will be over. Overall, there will be ten periods in this experiment. You will generally be matched exactly once with each person in the employer group. You will never be matched with the same person in successive periods. Further, you will not know with whom you have been matched in any of the periods. Your total income for the participation in this market will be the sum of the earnings in each of the ten periods.

How the Labor Market Works

1. At the beginning of each period we will open the labor market. In the first stage of the labor market each employer may offer a wage to an employee. This employee must accept this wage offer, forming a labor contract. **Wage offers must be no less than 20 Guilders and no more than 120 Guilders**.

2. You must **immediately record this wage on the decision sheet for that period**.

3. Each employee has to bear travel costs of 20 Guilders.

4. **No employer will know with which employee s/he has concluded a contract, and no employer will know the employee**.

5. After all wage offers are collected, the second stage begins. Now employees must choose a quantity of work. We will then relay "your" employee's chosen quantity of work to you. Please do not tell anyone what quantity of work s/he chose. No other employee and no other employer will be informed about the quantity of work "your" employee has chosen.

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How do you Calculate Your Employee's Income in Each Period?

1. An employee will receive the wage s/he has accepted. From this wage s/he must, however, subtract the travel costs of 20 Guilders and the costs of the quantity of work s/he has chosen.

3. Employees determine their quantity of work by choosing a number between 0.1 and 1.0 from the schedule below. The lowest amount of work you can choose is 0.1, 0.2 is a slightly higher amount, and so on up to 1.0, the highest amount.

3. The higher the quantity of work s/he chooses, the better it is for you. The higher the number s/he chooses, that is, the quantity of work, the higher your income.

4. The higher the amount of work s/he chooses, the higher the work related costs will be. You can find out an employee's work related costs by looking in the schedule below.

5. An employee's income in Guilders will be determined by the following formula:

Income(4) = Wage(1) - Costs of Quantity of Work(2) - Travel Costs(3)

Schedule of feasible amounts of work (AW) and corresponding work related costs to employees (COST)

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

How do you Calculate Your Income in Each Period?

1. You will receive from the experimenter 120 coupons which you may use to pay wages. If you offer a wage of 120 Guilders, then you will have no income coupons left. If you offer a wage of 20 Guilders then you will have 100 income coupons left. In general, you will have

120 coupons - wage

income coupons left.

2. How are the remaining coupons converted into Guilders? The number of coupons retained by you is multiplied by the quantity of work your employee has chosen. This result is your income in Guilders. Thus:

Your Income in Guilders(4) = {# of Coupons(1) - Wage(2)} x Quantity of Work(3)

Please Note: The income of all employees and employers will be computed according to the same rules. Every employer has 120 Coupons and the work related cost-schedule as well as the travel costs are the same for every employee. Every employer is able to compute the income of "his" or "her" employee, and every employee is able to compute the income of "his" or "her" employer.

Let's Have an Exercise

1. Let's assume that you used your 120 Coupons to offer a wage of 110 Guilders, which is accepted. At the second stage of this period this employee chooses a quantity of work of 0.5.

What will your income and the income of your employee be?

My Income = ... Guilders

Employee's Income = ... Guilders

2. Let's assume that you used your 120 Coupons to offer a wage of 28 Guilders, which is accepted. At the second stage of this period this employee chooses a quantity of work of 0.6.

What will your income and the income of your employee be?

My Income = ... Guilders

Employee's Income = ... Guilders

3. Now let's assume again that you used your 120 Coupons to offer a wage of 28 Guilders, which is accepted. However, suppose that at the second stage of this period this employee now chooses a quantity of work of 0.1.

What will your income and the income of your employer be?

My Income = ... Guilders

Employer's Income = ... Guilders

Schedule of feasible amounts of work (AW) and corresponding work related costs to employees (COST)

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

Employer Number:

Period Number:

# of Coupons (1)	120
Wage (2)	.....
Amount of Work Chosen by	.....
Your Income in Guilders (4)	..... Guilders

Travel Costs	=	20 Guilders
Employee's Income in Guilders	=	Wage - Costs of Amount of Work Chosen - Travel Costs

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Employees will choose one of the feasible amounts of work (AW) from the first row. The higher the number, the higher the amount of work.

The second row of the schedule shows the cost of each amount of work (COST) for the employee. The higher the amount of work, the higher the costs to the employee.

Schedule of feasible amounts of work (AW) and corresponding work related costs to employees (COST)

AW	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
COST	0	1	2	4	6	8	10	12	15	18

APPENDIX B- Wage/effort pairs

Random-generated wages

	Effort									
Wage	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0
20	17	3	2							
25	2		1	1						1
30	2									
35	2	2								
40	9	1	3							2
45	5	2			1					
50	4	1	2	3		1				2
55		1		1					1	
60	10	4	7	10	5		1		1	3
65	1		2							1
70	8	4	1	2	7		4	1		1
75	4	3		1	2	3		2		
80	4	1	4	3	1	1	4	1	1	
85						2	1	1		
90	2					1		2	1	

Third-party-generated wages

	Effort									
Wage	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0
20	14		1							
25	3		2							
30	1	2								
35	7		1		1					
40	9	3	4	1						
45	1	2	3	2						
50	3		4	5			2			
55	2			1						
60	13	2	4	7	14	2	1			
65			2	1		1				
70	10	2	2	5	10	2			2	
75	2	2	2	1	1	2	3			
80	10			1	2	2	7			1
85	1			1		1	1	1		
90	1			1		2	1			