The Economic Journal, **115** (*April*), © Royal Economic Society 2005. Published by Blackwell Publishing, 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA.

Technical Appendix to

OVERCONFIDENT: DO YOU PUT YOUR MONEY ON IT?

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Economic Journal, vol. 115 (*April*), pp. 305–318

Appendix

A.1. *Instructions*

Subjects received an instruction sheet on which, depending on the treatment, they were either told that they could win 150 ATS in cash or that they should imagine winning this amount. Furthermore, they were instructed about the voting procedure between the two conditions 'performance test' and 'lottery'. The text read as follows:

> Your task is to vote for one of two conditions: (a) 'performance test' or (b) 'lottery'. In the 'performance test' condition you win if your result is in the upper half of the persons present. In the 'lottery' condition you win if your rolling of a die shows a four, five or six. A confidential vote decides which condition determines your winning. If more than half of the persons present vote for the condition 'performance test', your result in the test determines your winning. If more persons vote for the condition 'lottery', your die determines your winning. No matter what the majority votes, the performance test and the lottery will be performed. You alone are informed about your individual result. Together with this feedback, your rolling of a die is performed. In the end, the average result of all persons present and the result of the vote will be announced.

A.2. *Time Sequence*

Subjects were asked for participation in an experiment about decision-making in classrooms and the local cafeteria. When a sufficiently large group was gathered, subjects were led into the laboratory and they sat at separate tables. The questionnaire set consisted of seven pages which were distributed and collected in sequence to avoid subjects being able to look ahead to upcoming material or back to their previous answers.

Page 1 of the questionnaire set contained the instructions for the voting procedure and examples. It was distributed to subjects, and instructions were read aloud. After subjects had completed the examples, experimenters gave the correct solutions and answered any questions regarding the voting procedure. When all questions were answered, page 2 was distributed.

Page 2 contained sample items of the vocabulary test and the voting decision. Sample items were read aloud, and subjects were asked to make their voting decision. When all subjects had done so, pages 1 and 2 were collected and page 3 was distributed.

Page 3 contained questions about the decision and about subjects' expectations about the test. Subjects were asked how sure they were to have made the right decision in the vote (scale 1 to 7 = very sure) and how difficult they would find it to change their decision (1 to 7 = very difficult). In an open-ended format, they reported the most important reason for their decision. Subjects were asked how important doing well in the test was to them (1 to

7 = very important) and how difficult they expected the test to be (1 to 7 = very difficult). Furthermore, subjects were asked how will they thought they would do in the test (1 to 7 = very good) and to provide estimates of their own score points in the test and the average score points of the group. When all subjects had finished, page 3 was collected and page 4 was distributed.

Page 4 consisted of a list of all words in the easy and difficult task and participants had to tick those words they thought that they were able to explain. When all subjects had finished, page 4 was collected and pages 5 and 6 were distributed.

Pages 5 and 6 contained the test items. Each page contained 10 sentences with gaps left blank in the middle, which participants had to complete by choosing two out of seven to nine options and writing the respective numbers into the gaps. When a participant indicated completion of pages 5 and 6, those pages were collected and the result of the test was computed. The individual score was noted in a list and on page 7 which was returned to the participant. On this occasion, subjects had to roll a die. The result of the die toss was noted on page 7 by the experimenters.

Page 7 contained questions about the test and subjects' decision in retrospect. Participants were asked about their satisfaction with their test result and the outcome of their die toss (1 to 7 = very satisfied). They also were asked how sure they were about their voting decision now and how difficult they would find it to change their decision. Furthermore, they had to rate the difficulty of the test in retrospect (1 to 7 = very difficult) and to give an estimate of the average score of the group. Finally, socio-demographic data on age, gender and occupation or course of study were collected.

When all participants had finished page 7, the median of test results and the result of the vote were announced. Participants had to leave the laboratory one by one to ensure anonymity of winners. In front of the door, they handed over their page 7 to the experimenter. In the money conditions, winners got 150 ATS in cash and were asked to sign a receipt. All participants were thanked for participation and got some sweets as a small reward. The whole procedure took 30 minutes per group. A detailed time sequence, grouped according to participants and experimenter, is presented in Table 13.

Table 13

Time Sequence for the Experiment

Participants	Experimenter
	Pages [1–2] distributed
Page [1]: Instructions, practice examples	Instructions read aloud, correct solutions announced
Page [2]: Sample test items, voting decision	
	[1–2] collected, [3] distributed
Page [3]: Questions before test	
	[3] collected, [4] distributed
Page [4]: List of words	
	[4] collected, [5–6] distributed
Pages [5–6]: Test	
	[5–6] collected, individual test performance computed, [7] distributed, individual die rolled
Page [7]: Questions after test	
	Group median test performance and voting outcome announced, [7] collected, payment

A.3. *A Game of Voting*

The purpose of this Section is to characterise all the symmetric equilibria of the voting game.

A.3.1. *The game*

The game in the experiment has the following form. There are $2N + 1$ players who have to choose to vote between a test or a lottery; 1 the choice of the test, and 0 the choice of the lottery. They take a test of skill, whose result is not announced until after the vote. Payoffs are in monetary terms and players are risk neutral. If the majority of players chooses the lottery, then each player gets $1/2$ unit of utility. If the majority of the players choose the test, then players will be ranked according to performance, and the players in the better half will win the prize of one unit.

The set of types of players is denoted by Θ, a subset of the real line. A higher type is better, and gives a higher probability of winning the test. Without loss of generality we may assume that the performance in the test is ranked as the types are ranked. Types are distributed according to joint distribution G.

A strategy profile is a map $(v^i)_{i=1,\ldots,N}$, each v^i mapping the type into the mixed strategies. We denote by $v^i(\theta)$ the probability of voting for the test for player i of type θ. An equilibrium is *symmetric* if

$$v^i = v^j \text{ for every } i, j, \tag{A.1}$$

and is *monotonic* if

$$\theta \geq \theta' \text{ implies } v^i(\theta) \geq v^i(\theta') \text{ for every } i. \tag{A.2}$$

For symmetric equilibria we denote with v the common strategy of the players.

THEOREM 1. *Assume that types are independent and that the distribution G has a continuous density. Then for any θ^* in the support of G, the strategy:*

$$v(\theta) = 1 \text{ if } \theta \geq \theta^*, = 0 \text{ otherwise}$$

is a symmetric monotonic equilibrium.

Consider in fact any player with a $\theta > \theta^*$. To decide on the vote for the test or the lottery he is computing the expected payoff from the vote for the test, compared to the expected payoff of $1/2$ from the lottery. As standard in voting theory we only need to consider the event P, at which the player is pivotal, that is the set of all vectors of types θ^{-i} such that there is a set A of M players with type above θ^* and a set B of M players with type below θ^*. In turn this event consists of two sub-events. In the first, all of the players in the set A have a type above θ and in the second at least one of the players in A has a type below θ. The expected payoff in the first event is exactly $1/2$, since the player we are considering is going to be the median type player. In the second event the payoff is 1. Since G has a continuous density, the second event has positive probability, so the choice of 1 in the vote is strictly better for our player. We have proved that for any player with type larger than θ^* the best response is to vote for the test. An analogous argument shows that a player with type lower than θ^* votes for the lottery.

In particular, an equilibrium is the one where all players vote for the test when their type is higher than the median value of the type.

We remark that the indeterminacy of the equilibria is very fragile. Consider the same game, where the player winning in the test get any $b > 1$. Then the only symmetric monotonic equilibrium is:

$$v(\theta) = 1 \text{ if } \theta \geq \theta^*, = 0 \text{ otherwise}$$

with $\theta^* = 0$. The argument is similar to the one we have seen for the proof of the theorem.

A.4. *Statistical Appendix*

Table 14

Summary Statistics, Before the Test

Variable	Mean	st.d error	(95% conf. interval)
Predicted own performance	12.51	0.30	(11.92, 13.11)
Predicted group performance	13.37	0.24	(12.90, 13.83)
Sure	5.16	0.14	(4.89, 5.44)
Difficult to change	3.66	0.15	(3.37, 3.96)
Important	3.24	0.16	(2.92, 3.55)
Difficult test	4.58	0.10	(4.38, 4.79)
Good in test	4.29	0.10	(4.10, 4.48)

Note: *sure* 'How sure are you to have made the right decision in the vote' (7 = very sure); *difficult to change* 'How difficult would you find it to change your decision' (7 = very difficult); *important* 'How important is doing well in the test to you' (7 = very important); *difficult test* 'How difficult do you think the test will be' (7 = very difficult); *good in test* 'How good do you think you will be in the test' (7 = very good), $n = 134$.

Table 15

Summary Statistics, After the Test

Variable	Mean	st.d error	(95% conf. interval)
Actual own performance	11.83	0.45	(10.94, 12.72)
Estimated group performance	13.43	0.30	(12.84, 14.03)
Satisfied	4.34	0.18	(3.98, 4.69)
Sure after	5.33	0.15	(5.03, 5.63)
Difficult to change after	4.15	0.18	(3.79, 4.51)
Difficult test after	4.48	0.14	(4.20, 4.75)

Note: *satisfied* 'How satisfied are you with your result in the test' (7 = very satisfied); *sure after* 'How sure are you now to have made the right decision in the vote' (7 = very sure); *difficult to change after* 'How difficult would you find it now to change your decision in the vote' (7 = very difficult); *difficult test after* 'How difficult do you think the test was' (7 = very difficult), $n = 134$.

Table 16

Regression of Actual Performance over Predicted Own Performance

	R^2	F	Prob > F
	0.1473	22.79	0.00001
Actual own performance	Coefficient	t	P > t
Predicted own performance	0.5743 (0.1203)	4.77	0.0001
Constant	4.6404 (1.5624)	2.97	0.004

Table 17

Logit Regression of Vote for Test Over Performance Predictions, for the Difficult, Money Treatment

	pseudo-R^2	χ^2	Prob > χ^2
	0.0106	0.51	0.7745
Vote	Coefficient	*z*	*P* > *z*
Predicted own performance	0.0495 (0.1178)	0.42	0.674
Predicted group performance	−0.1030 (0.1464)	−0.70	0.482
Constant	0.3008 (1.5019)	0.20	0.841