<center>**Appendix for**</center>

<center>**"Institutions and Behavior: Experimental Evidence on the Effects of Democracy"**</center>

1. Instructions

1.1 Original sessions

Welcome

You are about to participate in a study on decision-making, and you will be paid for your participation in cash, privately at the end of the session. What you earn depends partly on your decisions, partly on the decisions of others, and partly on chance.

Please turn off pagers and cellular phones now. Please close any program you may have opened on the computer.

The entire session will take place through computer terminals, and all interaction between you will take place through the computers. Please do not talk or in any way try to communicate with other participants during the session.

We will start with a brief instruction period. During the instruction period you will be given a description of the main features of the session and will be shown how to use the computers. If you have any questions during this period, raise your hand and your question will be answered so everyone can hear.

General Instructions

Please double click on the icon named Experimental Login and wait for instructions. In the space marked name please enter the computer number in the white sticker, as shown on the screen at the front of the room, and click: SUBMIT. This will log you on to the session.

Please do not proceed any further until you are told to do so.

Any questions?

This experiment consists of two parts. For all parts of this experiment you will be divided into groups of four people.

<center>1</center>

Part 1

In part 1 you will be asked to make decisions in several rounds. You will be randomly paired with another person in your group for each round. Once a round is finished, you will be randomly paired with another person in your group for a new round. There will be 10 rounds in the first part of this experiment.

In each round you and the person you are matched with will simultaneously and independently choose one of two actions, 1 or 2. The payoff you will earn depends on both your action and the action of the person you are matched with as shown at the screen in the front of the classroom. The exchange rate of points to dollars is 50 points for one dollar.

If the person you are matched with chooses 1 and you choose 1, you earn 40 points. If the person you are matched with chooses 1 and you choose 2, you earn 10 points. If the person you are matched with chooses 2 and you choose 1, you earn 60 points. If the person you are matched with chooses 2 and you choose 2, you earn 50 points.

Please look at the screen at the front of the room. This is what your computer screen will look like. Your possible actions are 1 and 2, denoted in red. The possible actions of the person you are matched with are in blue. As you can see, the screen gives you the payoff associated with each pair of actions. The payoffs are expressed in points. You may choose your action by clicking on the corresponding action.

The computer screen also shows your past actions, the past actions of the participants you were matched with and your payoffs at the bottom. You will be paid the sum of your points privately at the end of the experiment.

Any questions?

We start with part 1 now. Remember, you will now participate in 10 rounds, for each round you will be randomly match with another participant in your group. Make your decisions.

This is the end of part 1.

Part 2

In this part of the experiment you will participate with the same group in 10 rounds as in part 1 with the difference that the payoffs may be modified. As shown at the screen in the front of the classroom, if payoffs are modified the new payoffs will be as follows: If the person you are matched with chooses 1 and you choose 1, you earn 40 points. If the person you are matched with chooses 1 and you choose 2, you earn 10 points. If the person you are matched with chooses 2 and you choose 1, you earn 48 points. If the person you are matched with chooses 2 and you choose 2, you earn 50 points.

The screen also shows the initial payoffs.

Whether the payoffs are modified is determined as follows. First, your group is going to vote on whether to modify payoffs. Second, the computer will randomly choose whether to consider the votes or not in your group. If the computer considers the votes then majority wins and in case of a tie the computer will flip a coin. If the computer does not consider the votes in your group, it will randomly choose whether to modify payoffs or not.

Your computer screen will inform you if the computer randomly choose to consider the votes or not and whether payoffs are modified or not.

This slide summarizes the voting stage. First the group votes. Then the computer randomly decides whether to consider the votes or not. If it considered the votes then majority wins. If the computer does not consider the votes, then it randomly chooses whether to modify the payoffs or not. Your computer screen will show a screen like this if it did not consider the votes and like this if it did and so on.

Any questions?

Vote now.

You will now participate in 10 rounds, for each round you will be randomly match with another participant in your group.

Any questions?

Make your decisions.

This is the end of the main decision-making portion of part 2, before the end of the experiment please answer the following questions. The first question is: Could you please explain your voting decision? Please press submit when you finish.

The second question is: What was the result from the voting stage? You will receive 100 points for a correct answer.

The third question is: How did the result of the voting stage affect your decisions in the second part of the experiment? Please press submit when you finish.

The fourth question is: Under the initial payoffs, what is the payoff in points you received depending on your action (in red) and the action of the person you are matched with (in blue)? You will receive 10 points for each correct answer. Please fill in the matrix and press submit.

The fifth question is: Under the modified payoffs, what is the payoff in points you received or would have received depending on your action (in red) and the action of the person you are matched with (in blue)? You will receive 10 points for each correct answer. Please fill in the matrix and press submit.

Finally, please answer the next questions that appear in your screen. 1) What is your major? (if you have not decided please write undecided). 2) What is your class? (Freshmen, Sophomore, Junior, Senior, if other please explain). 3) What was your SAT score? (if you took it more than once please report the highest one) and 4) What is your political philosophy?

Before ending the experiment we will ask you to make one last decision. Each participant will choose a number between zero and one hundred. The participant with the closest number to two thirds of the average of all numbers in your group will earn 100 points. Please choose your number now

You now see your total payoff in a window. Please press ok to end the experiment. This is the end of the experiment. Please remain seated to receive your earnings; we will round up your total payoff to the highest quarter and add the show-up fee.

Thank you!

1.2. Additional sessions

Welcome

You are about to participate in a study on decision-making, and you will be paid for your participation in cash, privately at the end of the session. What you earn depends partly on your decisions, partly on the decisions of others, and partly on chance.

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Any questions?

This experiment consists of two parts. For all parts of this experiment you will be divided into groups of four people.

Part 1

In part 1 you will be asked to make decisions in several rounds. You will be randomly paired with another person in your group for each round. Once a round is finished, you will be randomly paired with another person in your group for a new round. There will be 10 rounds in the first part of this experiment.

In each round you and the person you are matched with will simultaneously and independently choose one of two actions, 1 or 2. The payoff you will earn depends on both your action and the action of the person you are matched with as shown at the screen in the front of the classroom. The exchange rate of points to dollars is 50 points for one dollar.

If the person you are matched with chooses 1 and you choose 1, you earn 40 points. If the person you are matched with chooses 1 and you choose 2, you earn 10 points. If the person you are matched with chooses 2 and you choose 1, you earn 60 points. If the person you are matched with chooses 2 and you choose 2, you earn 50 points.

Please look at the screen at the front of the room. This is what your computer screen will look like. Your possible actions are 1 and 2, denoted in red. The possible actions of the person you are matched with are in blue. As you can see, the screen gives you the payoff associated with each pair of actions. The payoffs are expressed in points. You may choose your action by clicking on the corresponding action.

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Any questions?

We start with part 1 now. Remember, you will now participate in 10 rounds, for each round you will be randomly match with another participant in your group. Make your decisions.

This is the end of part 1.

Part 2

In this part of the experiment you will participate with the same group in 10 rounds as in part 1 with the difference that the payoffs may be modified. As shown at the screen in the front of the classroom, if payoffs are modified the new payoffs will be as follows: If the person you are matched with chooses 1 and you choose 1, you earn 40 points. If the person you are matched with chooses 1 and you choose 2, you earn 10 points. If the person you are matched with chooses 2 and you choose 1, you earn 48 points. If the person you are matched with chooses 2 and you choose 2, you earn 50 points.

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Your computer screen will inform you if the computer randomly choose to consider the votes or not, whether payoffs are modified or not and will provide information regarding the votes.

This slide summarizes the voting stage. First the group votes. Then the computer randomly decides whether to consider the votes or not. If it considered the votes then majority wins. If the computer does not consider the votes, then it randomly chooses whether to modify the payoffs or not.

Your computer screen will show a screen like this if there were at most 2 votes in favor of modification, or like this if there were at least 2 votes in favor of modification, and like this if the computer randomly choose to consider the votes and so on.

Any questions?

Vote now.

You will now participate in 10 rounds, for each round you will be randomly match with another participant in your group.

Any questions?

Make your decisions.

This is the end of the main decision-making portion of part 2, before the end of the experiment please answer the following questions. The first question is: Could you please explain your voting decision? Please press submit when you finish.

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Thank you!

2. Estimation of democracy effects using individual data after round 11

In this appendix we describe in detail the methodology used to estimate the effect of democracy in all rounds after the voting stage discussed in section 4.2. We focus on the effect of democracy under modified payoffs. The methodology we present here allows us to estimate the effect of democracy on behavior after "controlling" for the fact that subjects under endogenous modification are more likely to meet subjects that voted for modification than subjects under exogenous modification are. In addition, this methodology considers the fact that a subject's behavior may be correlated with her previous behavior and be affected by the behavior of previous partners.

Consider the following model of behavior after the voting stage:

$$y_{1i} = x_i \beta_1 + u_{1i}$$
$$y_{2i} = x_i \beta_2 + \rho_{21} u_{1i} + \varphi_{21} y_{1,-i} + u_{2i}$$
(A1) $\quad y_{3i} = x_i \beta_3 + \rho_{31} u_{1i} + \rho_{32} u_{2i} + \varphi_{31} y_{1,-i} + \varphi_{32} y_{2,-i} + u_{3i}$,

$$\ldots$$

$$y_{ri} = x_i \beta_r + \sum_{s=1}^{r-1} \rho_{rs} u_{si} + \sum_{s=1}^{r-1} \varphi_{rs} y_{s,-i} + u_{ri}$$

where r denotes the round number in part 2 (for simplicity we start counting from 1), i denotes the subject and $-i$ denotes previous partner of i. The variable y_{ri} denotes cooperation in round r by subject i, $y_{r,-i}$ denotes cooperation in round r by subject i's partner in that round, and x_i is a vector of indicator variables for the four combinations of individual vote (yes or no) and whether votes where considered (Endo or Exo). The errors u_{ri} are assumed to follow these properties: $E(u_{ri}) = 0$, $E(u_{ri} u_{sj}) = 0$, and $E(u_{ri} x_j) = 0$ for any rounds r or s and subjects i or j. Note that (A1) is a linear approximations to decision rules and that our inference will be valid to the extent that this linear approximation is reasonable.

To estimate the parameters in (A1) we start by estimating the system in (A2) which differs from (A1) in that we include the previous behavior of the subject as a control instead of previous errors:

$$y_{1i} = x_i b_1 + \varepsilon_{1i}$$

$$y_{2i} = x_i b_2 + r_{21} y_{1i} + f_{21} y_{1,-i} + \varepsilon_{2i}$$

(A2) $\quad y_{3i} = x_i b_3 + r_{31} y_{1i} + r_{32} y_{2i} + f_{31} y_{1,-i} + f_{32} y_{2,-i} + \varepsilon_{3i}$,

...

$$y_{ri} = x_i b_r + \sum_{s=1}^{r-1} r_{rs} y_{si} + \sum_{s=1}^{r-1} f_{rs} y_{s,-i} + \varepsilon_{ri}$$

It can be easily shown that the errors in (A2) coincide with the errors in (A1): $u_{ri} = \varepsilon_{rj}$. Given our previous assumptions about the errors in (A1) it follows that the errors in (A2) satisfy all the requirements for an OLS regression: $E(u_{ri}) = 0$, $E(u_{ri} u_{sj}) = 0$, $E(u_{ri} x_j) = 0$ for any subjects i and j and rounds r and s, and finally $E(u_{ri} y_{sj}) = 0$ for any subjects i and j and rounds r and s such that $s<r$.

From the vector of estimated coefficients $(\hat{b}_r, \hat{r}_{rs}, \hat{f}_{rs})$ for (A2) we can construct the estimates of the coefficients in (A1) as follows:

$$\hat{\beta}_r = \hat{b}_r + \sum_{s=1}^{r-1} \hat{\rho}_{rs} \hat{b}_s$$

(A3) $\quad \hat{\rho}_{rs} = \hat{r}_{rs} + \sum_{t=s+1}^{r-1} \hat{\rho}_{rt} \hat{r}_{ts}$.

$$\hat{\varphi}_{rs} = \hat{f}_{rs} + \sum_{t=s+1}^{r-1} \hat{\rho}_{rt} \hat{f}_{ts}$$

This is straightforward for $r=1$, as the first equation in (A1) coincides with the first equation in (A2) and $\hat{\beta}_1 = \hat{b}_1$. For $r=2$, we can use the first equation in (A2) to substitute for u_{1i} in the second equation in (A1) and then:

$$y_{2i} = x_i(\beta_2 - \rho_{21}b_1) + \rho_{21} y_{1i} + \varphi_{21} y_{1,-i} + u_{2i} .$$

Which implies that $\hat{b}_2 = \hat{\beta}_2 - \hat{\rho}_{21}\hat{b}_1$, $\hat{r}_{21} = \hat{\rho}_{21}$ and $\hat{f}_{21} = \hat{\varphi}_{21}$. Rearranging, we find the equalities in (A3) for $r=2$. For $r=3$, we can use the first two equation in (A2) to substitute for u_{1i} in the third equation in (A1) and then

$$y_{3i} = x_i(\beta_3 - \rho_{31}b_1 - \rho_{32}b_2) + (\rho_{31} - \rho_{32}r_{21})y_{1i} + \rho_{32} y_{2i} + (\varphi_{31} - \rho_{32}f_{21})y_{1,-i} + \varphi_{32} y_{2,-i} + u_{2i}$$

Which implies that $\hat{b}_3 = \hat{\beta}_2 - \hat{\rho}_{31}\hat{b}_1 - \hat{\rho}_{32}\hat{b}_2$, $\hat{r}_{31} = \hat{\rho}_{31} - \hat{\rho}_{32}\hat{r}_{21}$, $\hat{r}_{32} = \hat{\rho}_{32}$,

$\hat{f}_{31} = \hat{\varphi}_{31} - \rho_{32}\hat{f}_{21}$ and $\hat{f}_{32} = \hat{\varphi}_{32}$. Rearranging, we find the equalities in (A3) for *r=3*. In similar way we can verify (A3) for *r>3*.

With the vector of estimates $(\hat{\beta}_r, \hat{\rho}_{rs}, \hat{\varphi}_{rs})$ we can calculate the effect of democracy by round. As said before, we focus on groups with payoff modification. First, we calculate the direct effect of democracy by individual vote and round: DED_{rv}, where *r* denotes the round and *v* the individual vote (yes or no). The direct effect of democracy can be thought as the difference in cooperation under endogenous and exogenous modification once we control for the behavior of previous partners. This difference can be calculated as $DED_{rv} = \hat{\beta}_{rv,Endo} - \hat{\beta}_{rv,Exo}$, where $\hat{\beta}_{rv,Endo}$ is the estimated coefficient for those in round *r*, with individual vote *v* and whose vote was counted (endogenous modification) and $\hat{\beta}_{rv,Exo}$ is the coefficient for those whose vote was not counted (exogenous modification).

The effect of democracy is not only the direct effect as a subject's behavior is modified by the behavior of other subjects which in turn depends on whether payoffs are modified endogenously or exogenously. We calculate the effect of democracy ED_{rv} on round *r* for subjects with vote *v*, as follows:

$$ED_{1v} = DED_{1v}$$
$$ED_{rv} = DED_{rv} + \sum_{s=1}^{r-1} \hat{\varphi}_{rs}\left(p_{vy}ED_{ry} + p_{vn}ED_{rn}\right)'$$

where $\hat{\varphi}_{rs}$ is the estimated coefficient measuring how subjects' cooperation in round *r* responds to cooperation by their partners in round *s*, and p_{vy} and p_{vn} denotes the probabilities that a subject with vote *v* meets a *yes* and *no* subject respectively under endogenous modification. The estimates of the effect of democracy under modification are presented in Table 6.