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An Experimental Test of a Causal Relation
and of Underlying Mechanisms**

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Abstract

Democracies go to war with each other less frequently than dictatorships do with each other. This is an established empirical regularity. However, it is not clear whether there is a causal link between democracy and peace. We use laboratory experiments to study whether there is a causal impact. We study the bellicosity of democracies compared with two types of dictatorships, inclusive and exclusive, where each society is composed of three members. We also analyze how bellicosity depends on the presence of the possibility of deliberation among the members of a society. Neither the ‘voting’ nor ‘inclusion’ aspect of democracy nor ‘deliberation’ in isolation has a positive causal impact on peace. However, when all three are combined, there is evidence that their combination produces less bellicosity than some kinds of dictatorship. It is the availability of deliberation that makes the crucial distinguishing difference for democracy in our experiment. We observe democratic peace only in the presence of deliberation.

Keywords: conflict, governance, democracy, dictatorship, inclusivity, lab experiment.

JEL Classification Codes: C72, C91, C92, H11.

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1. Introduction

The term ‘Democratic Peace’ describes an empirical regularity. Democratic countries go to war with each other less frequently than do pairs of dictatorships. Although controversial (e.g. Raknerud 1997), it is claimed to be ‘as close as anything we have to an empirical law in international relations’ (Levy 2002, p. 270). However, using observational data alone, it is impossible to determine whether this relationship is causal. We use the methodology of experimental economics to ask whether democracy produces peace, and if so why?

This test is important because the causal version of the thesis influences policy. US foreign policy is one illustration. Woodrow Wilson (in 1917, at the end of WW1) and, more recently, both Bill Clinton in 1994 and George W. Bush ten years later encouraged the spread of democracy internationally because they thought it would promote peace in the world.¹ The causal interpretation is important for this reason, but it is also controversial. This is because there are alternative possible explanations of the empirical association. It has been argued, for instance, that the correlation largely arises from the post-WW2 experience of peace in the Americas and Western Europe, which has been driven by *Pax Americana* with its commitment to the expansion of democracy (see Rosato 2003). In a similar fashion, it is possible to argue that the practice of EU expansion has been to make democracy a condition of membership. It could be this practice, together with the way economic integration promotes peace, that explains the association in post-WW2 Europe and not any causal link between democracy and peace.

Since there are few natural experiments that allow the effects on bellicosity of a controlled change in governance arrangements to be studied, those working with observational data have attempted to address the causal claim by examining whether there is evidence that is consistent with particular causal mechanisms producing peace among democracies (see Rosato 2003, and Doyle 2005). The evidence on these causal mechanisms is also controversial, in part for the same reason that the evidence takes the forms of empirical associations. The methodological advantage in this context of a laboratory experiment is clear: in principle, an experiment can be designed to test both for governance treatment effects and for the precise

¹ See Bill Clinton’s State of the Union Address, 1994 (‘Ultimately, the best strategy to ensure our security and to build a durable peace is to support the advance of democracy elsewhere. Democracies don’t attack each other’) and George W. Bush at the Bush/Blair meeting November 12, 2004 (‘The reason why I’m so strong on democracy is democracies don’t go to war with each other’).

causal mechanisms. This is what we do.

Our approach is to develop a simple experimental model that captures both the key features of a country's governance arrangements for making collective decisions (e.g., over conflict) and the key elements of conflict between countries. This allows us to test for the causal influence of each feature of democratic governance – singly and in combination – on bellicosity and to explore several precise causal mechanisms.² Experiments have long been used in economics for this purpose, beginning with early market experiments used as models to test different types of auctions (Ketcham et al. 1984). The markets in these papers are clearly artificial, yet they provide a clear “model” of markets that serve as a platform for gaining powerful insights into the operation of real market institutions where theory has little to say. Experimental models also have been used as “wind tunnel” tests of potential policy designs, contributing to the development of better policies, such as methods for issuing and trading emissions permits (Cason and Plott 1996). The challenge in creating an experimental model is parallel to the development of a formal theoretical model, in the selection of key elements to include, and unnecessary complications to exclude, so that the model is both rich enough to be meaningful and sufficiently streamlined to be tractable, i.e., to be translated effectively into a set of instructions for subjects to follow.

For this purpose and following Diamond 2016, we identify three distinguishing features of governance arrangements that help identify a democracy. They are: voting v. dictatorship in the determination of important policy decisions like going to war; equal v. unequal treatment of individuals; and citizen participation v. non-participation in policy deliberation. The internal governance arrangements of our groups in the lab vary along these three dimensions (details below) and we capture the warfare decision through a decision each group makes over how much to invest in winning an inter-group conflict. War is a generically costly mechanism for resolving whose interest prevails in such circumstances. It is costly because it uses resources in determining the outcome of a conflict, and these resources could alternatively have been used ‘productively’ to increase the total sum of goods and services available to both groups. Wars, in practice, also come in a variety of forms and intensities. Our experimental design imposes a simple conflict of interest with these attributes between two teams. There is a prize that only one

² This type of experiment is sometimes referred to as a behavioral model (Croson and Gächter 2010), exhibit (Sugden 2005) or material model (Schmidt 2009)

of the teams can obtain. We capture both the wasteful aspect of war and the variation in its intensity by allowing each team to decide, through a tax on each individual member's endowment, how much to invest in obtaining the prize for their team. The teams' investments determine each team's relative likelihood of winning the prize in the manner of a Tullock contest (Tullock, 1980). To capture the opportunity cost of investing in warfare, the post-tax residuals of the individual endowments are available for productive employment either in a private account or a public good account, in the manner of a standard linear public good game (Isaac and Walker 1988). Our measure of a team's bellicosity then becomes the fraction of resources used in attempting to win the prize, and the intensity of the actual conflict that ensues (the 'war') is given by the total spent on winning the prize.

1. Voting v. dictatorship.

This feature of governance in our experiment concerns how the collective decision is made over the tax rate to fund the investment in winning the contest. In a democratic team everyone has a vote in an election that determines this tax rate. In a dictatorship, one person within the group, the same one throughout, always decides on this tax rate.³ We call this the 'voting' attribute of a democracy and dictatorships do not have it. Voting is fundamental to our definition of democracy because it is always present in a democracy, but it is not the only feature required of a democracy in our experiment. Our definition of democracy always combines 'voting' with equal treatment.

2. Equal v. unequal treatment of citizens.

This element relates to possible constraints on collective decision making: in particular, whether individuals have to be treated equally under joint decisions. In our setting the two joint actions relate to conflict investment and public good allocation; we implement the equal treatment constraint as the equal allocation of any benefit from these decisions. Thus equal treatment requires that when a team wins the conflict, the prize is shared equally among team members and, insofar as the residual endowments are allocated to the public good, the benefits of this public good are also shared equally. Such equal treatment is a form of 'inclusivity,' and we use this term hereafter to describe this feature so as to make explicit the potential connection to

³ To the best of our knowledge, there are no previous studies specifically addressing how the collective decision is made in this type of contest setting. Abbink et al. 2010 and Fallucchi et al. 2020 are good examples of how group decisions come from voluntary 'taxes,' paid individually, in intergroup Tullock contests.

Acemoglu and Robinson's (2012) analysis of different governance arrangements.

We make the design choice to define democracy (D) in this way, through a combination of 'voting' and 'inclusivity.' This is because Kant's (1789) original causal argument was specifically that a republican democracy (not just any democracy) generated peace. To be 'republican,' individuals must be afforded equal standing in society: they must be citizens with rights and not simply the subjects. This is a common idea in liberal versions of democracy. Individuals do not simply vote in a liberal democracy, they have 'rights' and these 'rights' protect all individuals equally from some types of collective decision. De Tocqueville (1840), for instance, makes a similar point when famously identifying democracy in America with a fundamental equality of conditions.⁴

In principle, in this framework, a dictatorship might be combined either with 'inclusivity' or its absence. We term its absence in dictatorship 'extractive.' This is a natural extension of the terminology used in Acemoglu and Robinson 2012 because, in our experiment, the dictator in an 'extractive' dictatorship also decides how to allocate the contest prize and the public good (as well as the tax rate). They can literally 'extract' for themselves all the benefits of joint actions. Thus we have two possible types of dictatorship: 'inclusive' (I) and 'extractive' (E). We consider both types of dictatorship in the experiment for two reasons. First, although at first sight, an 'inclusive' dictatorship may seem akin to an oxymoron, there are examples that combine non-voting or weak electoral competition with respect to the voting dimension with elements of 'inclusivity' (e.g., in countries with effective one-party rule that nevertheless have a tradition of equal treatment via the rule of law, like Singapore and Hong Kong (see also Makrund and Rodrik 2015). Second, the consideration of two kinds of dictatorship allows us to identify which feature of a democracy affects its bellicosity. Thus our first three governance treatments consist of D, I and E and we label these as D-NC, I-NC, E-NC, where NC indicates "no chat," to take account of deliberation, the final feature of governance.

3. Participation in deliberation v non-deliberation.

This feature relates to whether individuals can participate in collective decision making through discussion as well as voting. The addition of this discursive possibility is what distinguishes so-called deliberative or participatory democracies (Pateman 1970; also see Gastil

⁴ See also Buchanan and Congleton 1998 who make a different argument why their 'generality principle' has to be linked to voting in a democracy.

2018 for a recent survey of experiments on the influence of deliberation in democracies). We implement deliberation through a ‘chat’ facility (C) in the experiment where all citizens can communicate to each other freely, without any of them having an advantage over any of the others (see for example, Brandts et al., 2019 and the references therein). We denote its absence by NC. Thus we have two models of democracy with and without the chat feature: D-C and D-NC. Although deliberation/chat can be a feature of democracy, and such deliberation is less frequently found in authoritarian governments, dictatorships could, in principle, also have consultative mechanisms that enabled discussion among individuals. To allow for this possibility, and again to aid in the identification of the causal effects of chat, we have two further contrasting types of dictatorship: an ‘inclusive’ dictatorship + chat = I-C; and an ‘extractive’ dictatorship + chat = E-C. Overall, we therefore have six distinct governance arrangements, summarized in Table 1 below.

We test the democratic peace causal thesis in two ways. First, we examine whether single or combined changes in these three features of governance arrangements produce ‘treatment effects’ on the level of conflict investment observed. Our key conclusion is that the democratic peace causal thesis does not hold for our first model of democracy ((D-NC): without the ability to communicate, democracy (D-NC) is more bellicose than both the I-NC and E-NC forms of dictatorship. The presence of deliberation/chat, however, overturns this conclusion dramatically. The Democratic Peace causal thesis does plausibly hold for our second model, the deliberative democracies: that is, D-C is less belligerent than one type of dictatorship, I-C, and no more belligerent than the other type, E-C. Deliberation is a potent force for peace in this sense, but, interestingly, it has this effect only under democracy. Deliberation does not significantly lower conflict in either type of dictatorship. In short, deliberation is especially important in democracies and the case for the democratic peace causal thesis depends on its presence.

Our second test of the causal thesis involves the specific causal mechanisms that might explain what we observe. Typically two causal mechanisms have been identified in the literature (Rosato 2003). One relates to the way that a change in governance institutions alters incentives to action (also see Doyle 1993, Levy and Razin 2004, and Conconi et al., 2014). We can test for this possibility because our experimental model together with the assumption of individual rationality generates precise predictions regarding how the changes in governance affect incentives and behavior. The other causal mechanism turns on the possibility that different

governance arrangements call forth different preferences (see Bowles and Polanía-Reyes 2012) or encourage different behavioral norms (e.g., Rosato 2003). We test for this possibility by introducing behavioral hypotheses into our experimental model. In particular, using behavioral insights, we hypothesize that governance arrangements might either change the preferences that individuals act upon; or shift individuals from individual rational choice reasoning to a form of team reasoning.

We find virtually no evidence that the differences in incentives under the various governance arrangements, by themselves, explain the variety of conflict investments. Instead, we find interaction: behavioral mechanisms help explain what we observe when allied to an understanding of the incentives. In particular, the combination of deliberation/chat with ‘voting’ and ‘inclusivity’ makes people more pro-social in the public goods game (a behavioral mechanism) and this increases the opportunity cost of investing in conflict because the return to contributing to the public good is higher (the incentives mechanism). This appears to be a part, but not all, of the explanation for lower conflict expenditure in deliberative democracies.

In the next section, we set out the experimental design. Section 3 gives the results with respect to the democratic peace causal thesis and the specific causal mechanisms. In Section 4, we discuss these results and examine in more detail the transformative effect of deliberation. Section 5 concludes.

2. Experimental design

Our subjects begin with an endowment of 100 tokens each per round, exchanged into US dollars at a rate of (10 tokens = \$1US). Subjects are organized into teams of size three, and teams remain the same for all periods. Teams are distinguished by their governance structures and interact in fixed pairs of teams over twenty periods. This design choice mimics the fact that individuals and governments interact over time. The game is finitely repeated in recognition that teams (in practice) and leaders have finite lives. In each period, a team first makes a decision about the tax rate for investment in winning the contest, and then individuals in the teams decide how to allocate remaining funds between private and public good group accounts. Two decisions are made within each team with respect to the use of these individual endowments in each period.⁵

⁵ The instructions can be found in Appendix A.

2.1. *The decisions.*

The first decision in each period is a collective one: what tax rate, in effect, is to be applied to everyone's individual endowment to fund an investment in trying to win a prize in a contest with another team. Under dictatorship the tax imposed applies to both dictators and non-dictators. The conflict is modeled as a standard Tullock contest where there is a prize (=600) and the probability of winning the prize depends on the relative size of each team's investment in trying to win the prize. A team is always in a contest with a team of the same governance structure. This is done to avoid complex strategic considerations involved in competing with groups that have different governance structures.

The second decision is an individual one. Once the collective decision has been made over the allocation of endowments to the contest, each individual must decide how to allocate what remains of their individual endowment to the private account, which returns one token per token invested, and to the public good. In the public good account, for the D and I governance structures, the marginal per capita return is 0.66 tokens (i.e. the contributions to the public good are multiplied by two and distributed evenly among the contributors.) In the E governance structures, the dictator determines the distribution of the doubled contributions to the public good, as explained below.

The public good contribution decision is made before knowing the outcome of the contest to mimic the traditional allocation of resources between "guns and butter" in society in the simplest way. The funds not used for conflict have an opportunity cost, consisting of the use of funds for private or public goods. In this way, the alternative use of resources involves a choice between private and joint production (via a public good) and the latter is 'productive' in the sense that each unit is turned into two. This is more realistic as the productive use of resources can often be private or joint and the joint activity can have productivity advantages. It also enables us to examine whether the democratic/dictatorial character of their collective decision (i.e. its bellicosity) is associated with differences in their abilities to solve public goods problems. Note this means that the winner's prize cannot be invested in the public good.

After both decisions have been made in a period, subjects are informed about each team's investment in the conflict and which team won. They also receive information on the total contribution to their team's public good. Finally they receive information on their earnings for

this period derived from their share of this public good and the prize plus any residual amount in the private account.

2.2. *Governance of teams and treatment effects on conflict investment*

Teams are distinguished along three dimensions as discussed above: voting v. dictatorship, equal v. unequal allocation rules, and deliberation v non-deliberation. This 3 x 2 design gives rise to six governance structures: two are democracies and four are dictatorships.

The first rule (of decision making) variation relates to how the collective contest investment decision is made: the tax rate on individual endowments is determined either by voting or by a dictator. In the D governance structures, each member submits a suggestion and the median suggestion determines the tax rate, mimicking the median voter property of democracies. In teams with a dictator, one member is randomly selected at the beginning to be the “Group Decider” and thereafter this person always decides on the tax rate for the dictatorial team.

The second rule variation is ‘inclusivity.’ The public good and the contest prize, when won, are either divided equally in an ‘inclusive’ team or, in an ‘extractive’ dictatorship, its division among the team is determined by the Group Decider.

The variation in the ‘deliberation’ dimension consists in whether there is a one-minute anonymous chat facility (C) available to members of a team in each round or not (NC) before decisions are made.⁶ If there is scope for chat, the team is called deliberative. (The experimental instructions, of course, employ neutral labels and descriptions)

We combine these three sources of distinction in a 3x2 experiment design. This is set out in Table 1, where there are additional subject details. This design enables us to test for the causal influence of each governance variation singly and in combination. This is one of its virtues. Thus, for example, consider movement down a column: the comparison between D and I reveals the effect of ‘voting’ because this is the only difference; likewise the comparison between I and E isolates the effect of ‘inclusivity’; and the comparison of D and E gives the joint influence of ‘voting’ and ‘inclusivity’ because both have changed. Likewise, movement along each row gives the influence of ‘deliberation’ for each rule type.

⁶ Note we allow an additional minute for the first chat, so that chat is two minutes in the first round and one minute in each round after the first

Table 1: Design

	Deliberation	
	No chat	Chat
Democracy (D)	D-NC 48 subjects 16 teams 8 groups 960 rounds	D-C 48 subjects 16 teams 8 groups 960 rounds
Inclusive dictatorship (I)	I-NC 48 subjects 16 teams 8 groups 960 rounds	I-C 48 subjects 16 teams 8 groups 960 rounds
Extractive dictatorship (E)	E-NC 48 subjects 16 teams 8 groups 960 rounds	E-C 54 subjects 18 teams 9 groups 1080 rounds

These vertical and horizontal comparisons are the basis for our tests of the Democratic Peace causal thesis. In particular, the two key ‘treatment effect’ tests are that D-NC and/or D-C invest less in conflict than their dictatorial counterparts (I-NC and E-NC; and I-C and E-C respectively). That is:

DP1 (Democratic Peace Test 1): conflict investment is less in D-NC than either I-NC and/or E-NC

DP2 (Democratic Peace Test 2): conflict investment is less in D-C than either I-C and/or E-C

In addition, we test for specific causal mechanisms. That is, we study the possible mechanisms that cause the observed treatment effects. We consider two types of causal mechanisms: one turns on selfish rational choice behavior and the other on types of pro-social behavior that we think might be triggered by governance changes.

Rational choice analysis identifies how individual behavior is sensitive to incentives and since incentives to bellicosity may vary with governance, we can use it to generate predictions for the incentive causal mechanism. After this, we turn to some additional behavioral mechanisms regarding pro-sociality to capture the possible preference change/normative causal mechanisms.

2.3 Rational choice predictions and the incentive causal mechanism

We begin by assuming that individuals are motivated by pure self-interest. In the last period, equation 1 represents in a general way the expected return (ER) $\{\pi^e(x)\}$ in the contest to

an individual in D, I and E when deciding on what tax (x) either to propose in D or impose if they are a dictator in I and E.

$$\pi^e(x) = V \cdot \frac{3x}{(3x+Y)} - x \cdot \theta \quad (1)$$

Where Y is the total investment by the other team, V is the value of the prize to that individual and θ is the opportunity cost for that individual of paying one experimental point in tax. Using the first order conditions for maximization and solving for a symmetric equilibrium yields (2).

$$x^* = \frac{V}{4 \cdot \theta} \quad (2)$$

The opportunity cost of using an experimental point on tax for the contest is the value of that point in the alternative productive decision when allocating the post-tax endowment to the public good or the private account.

Consider first an extractive dictator's post-tax decision: every point they allocate to the public good generates two points and, since an extractive dictator chooses how to allocate these two points, they will, when selfish, allocate the two points to themselves. This contrasts with the value of one point for every point they keep in the private account. So the extractive dictator will always allocate all of their post-tax endowment to the public good. Hence their opportunity cost of using one of their experimental points in the contest is two. That is, for each one point they pay in tax, they could have obtained two from the public good ($\theta^E = 2$). In contrast, the opportunity cost of one tax point for all other individuals is equal to one. This is because the return from investing in the public good is always less than one (because everyone is selfish by assumption) and so the individual's interests are best served by keeping the post-tax endowment in the private account ($\theta^D = \theta^I = 1$). This is one key difference. The other is that an extractive dictator allocates the prize among members of their team when they win and so selfishly decides on 600 for themselves: $V^E = 600$. In contrast, inclusive dictators and democratic individuals share equally in the prize and so the value to them of winning is 200 ($V^D = V^I = 200$).

Using these different values for θ and V , we get an individual tax payment in the last period of 50 in D and I, and 75 in E. By backward induction, the same logic will apply in each prior period, and as communication is 'cheap talk' in this setting, the predictions are the same for each governance type under both C and NC. In the first three rows Table 2 sets out these predictions in full, including public goods contributions and earnings (= team earnings). We get back to the last row of Table 2 below.

Note that the predictions for D and I are the same: the inclusive dictator chooses the same tax rate that citizens choose in democracy, in both governance régimes there are no contributions to the public good and, as a consequence, earnings are the same in the two régimes. By contrast, in E the dictator imposes a higher tax rate for conflict investment than in D and I. Like in the other régimes the citizens contribute zero to the public good, but the dictator contributes a positive amount. Finally, the extractive dictator earns substantially more than the inclusive dictator and the citizens in E earn less than in the other two régimes resulting in total earnings in E being lower than in the other two régimes.

From these deductions, three specific incentive predictions (IP) follow regarding the influence of the democracy’s features of ‘voting’ (VIP), ‘inclusivity’ (IIP) and their combination (V+IIP). VIP is tested through a comparison of D and I as the only change is voting. For the same reasons IIP is tested on the comparison between I and E (as only inclusivity changes); the combined change of V+IIP is tested on D versus E.

VIP (Voting Incentive Prediction): ‘voting’ does not change the incentive to bellicosity with the result that conflict investment is same in D-NC and I-NC and it is the same in D-C as I-C.

IIP (Inclusivity Incentive Prediction): ‘inclusivity’ reduces the incentive to bellicosity in I as compared with E with the result that conflict investment is lower in I-NC than E-NC; and lower in I-C than E-C.

V+IIP (Voting and Inclusivity Incentive Prediction): ‘voting’ and ‘inclusivity’ reduce the incentive to bellicosity in D as compared with E with the result that conflict investment is lower in D-NC than E-NC; and lower in D-C than E-C.

Table 2: Per-capita predictions

	Conflict	Public Good	Earnings
Democracy (D)	50	0	150
Inclusive Dict. (I)	50	0	150
Extractive Dict. (E)	75	25;0*	350;25*
Team reasoner (D)	25	75	250

* refers respectively to the dictator and other members in E

2.4. Behavioral hypotheses and preference-change/normative causal mechanism

We propose three different behavioral mechanisms. They have in common that they affect conflict contributions via public good contributions; that is, they lead to changes in public

contributions, which then affect the opportunity cost of conflict investments and, hence, change their levels.

It has been argued that democratic governance arrangements encourage peace among democracies because they are conducive to the emergence of preferences or the development of norms that guide behavior towards peace among democratic countries (see Rosato 2003). We capture one such possibility through the hypothesis that ‘team reasoning’ rather than individual reasoning about public good contributions might be encouraged by democratic governance arrangements: that is, individuals in the team act to produce the highest returns to the team, as a whole, under democratic governance. With this form of team reasoning, individuals will expect full contribution to the public good by themselves and others in the team. So, the opportunity cost of a point spent on conflict now equals 2. The change in public good contribution will thus affect conflict investment. Since, the value to the individual decision maker of the prize is still 200 for a voter in D, we therefore expect the higher opportunity cost of investing in conflict to produce a fall in conflict investment under team reasoning. Table 2 gives the precise predictions. The team reasoning causal prediction (TRP) which pertain to public good contributions follows.

TRP (Team Reasoning Prediction): Public goods contributions are higher in D-NC than I-NC and E-NC, and higher in D-C than I-C and E-C because team reasoning is triggered by D.

Democracy might also encourage pro-social behavior in the public goods game through other mechanisms. We consider two such possibilities suggested by the behavioral literature. First, it has been found in experiments that ‘voting’ by itself has a beneficial effect on contributions to a public good (e.g., Sutter et al, 2009, and Dal Bo et al, 2010). In these experiments, voting is not directly analogous to our voting on the conflict investment. For example, in those experiments, it takes place over the punishment rules in the public goods game and not something like the collective conflict decision. Nevertheless, a punishment rule is a kind of collective good, so there is a basis in similarity for projecting these behavioral results on to our experiment on conflict investment. This is our voting behavioral prediction (VBP). We focus the prediction on those cases where the only change is in voting (e.g., D to I) to avoid possible confounds associated with a change in inclusivity that also arises in a comparison between D and E.

VBP (Voting Behavioral Prediction): Public goods contributions are higher in D-NC than I-NC and higher in D-C than I-C through influence of voting .

There is one potentially important difference between these earlier experiments on voting and our experiments. The influence of ‘voting’ in these experiments is judged through a comparison between collective decision through voting and the collective decision being alternatively made by ‘nature’. The alternative to voting is not another mechanism involving people (i.e. dictators) and there is some evidence that this weakens the influence of voting on public goods contributions (see Hargreaves Heap *et al*, 2020). So, VBP is to some degree speculative. Note also that the predictions contained in TRP contain the ones of VBP. Hence, if TRP holds, VBP will hold, but the reverse is not true.

Second, it is well known from public goods experiments that allowing deliberation encourages larger contributions to the public good (e.g. see Ostrom et al., 1992; Sutter and Strassmair, 2009). Larger contributions to the public good increases the opportunity cost of conflict in our set-up and so leads to a prediction that there will be less conflict with ‘chat’ under all governance arrangements (e.g. see earlier prediction regarding team reasoning). We ally this behavioral insight to a particular argument from John Stuart Mill that would make this effect especially strong under democracy and so provide a link between democracy and peace. In particular, John Stuart Mill, argues in *Considerations on Representative Government* (1861):

Still more salutary is the moral part of the instruction afforded by the participation of the private citizen, if even rarely, in public functions. He is called upon, while so engaged, to weigh interests not his own; to be guided, in case of conflicting claims, by another rule than his private partialities; to apply, at every turn, principles and maxims which have for their reason of existence the general good.....’ (Mill 1861, p.66-7)

In other words, the participation in decision making as a citizen of equal standing nudges people to think of the general interest and not just their own. De Tocqueville (1840) makes a similar claim when arguing that participation in political decision-making spills over to prime the other kinds of associational activity that he finds characteristic of democracy in America. We call this the Mill behavioral causal prediction (MBP).⁷ It suggests that the addition of deliberation is particularly powerful in generating pro-sociality under democracy. Thus we compare the change in public goods contributions from D-NC to D-C with the change that occurs between I-NC and I-C. and E-NC and E-C.

⁷ For some modern studies on deliberation see Karpowitz and Mendelberg (2011) and Myers and Mendelberg (2013).

MBP (Mill Behavioral Prediction): Public goods contributions increase by more in D than I and E through the addition of deliberation.

One final comment on the design is in order. Insofar as we find that either DP1 and/or DP2 is supported by the evidence of experiment, then we can also identify whether each feature of democracy singly contributes to the result or they act in conjunction. It thus enables us to engage in the debate in political science over whether the governance features operate singly or in conjunction. DP1 and DP2 refer to treatment effect tests of the Democratic Peace causal thesis that focus on the investments in conflict. Our causal mechanism tests focus again on treatment effects, but in addition to predictions regarding conflict investment they also refer to public goods contributions. This is because the causal mechanisms that we have identified work through public goods contributions changing and this alters the incentive to invest in conflict.

The tests of these causal mechanisms are interesting in their own right and, significantly, are separate from the causal test of the democratic peace thesis. The tests of the causal mechanisms are also important for the design of the experiment. Without such possible causal mechanisms, the direct test of the Democratic Peace causal thesis using the treatment effects on conflict investment might be difficult to interpret. The point is this. Suppose we do not find any treatment effects (e.g., there is no difference in bellicosity between D-NC and I-NC, or between D-NC and E-NC or between D-C and I-C, etc). How is this null result to be interpreted? It will only count against the Democratic Peace causal thesis if there are reasons for supposing that some causal mechanisms capable of generating the Democratic Peace thesis could have been in play in the experiment. If there are no potential causal mechanisms that might have been activated by the experiment, then the null result would not be surprising. Indeed the experiment would be poorly designed to test the causal thesis. For this reason, it is important that we have an experimental design with potential causal mechanisms in play. Otherwise, the ‘treatment effects’ test of the causal thesis is a weak test.

2.5. *Procedure*

The experiment was run in the Economic Research Lab at Texas A&M University, and was programmed using zTree (Fishbacher 2007). There were two waves, each conducted at the same time of the year (in 2016 and 2018). Subjects were undergraduates recruited from the general student population, aged from 16-49 and 49% were female. The average earnings were

\$27 and the experiment typically lasted 90 minutes. The number of subjects in each treatment is listed in Table 1. The instructions can be found in the appendix.

3. Results

3. 1. Governance Treatment Effects

We begin, through a vertical comparison of governance types in our 3x2 design shown in Table 1, to examine possible treatment effects that would indicate a causal relation between democracy and peace in the form of lower investments in conflict. For this purpose we have two kinds of democracy and in each case we can compare the democracy with two kinds of dictatorship (I and E). So, is D-NC less bellicose than either I-NC and/or E-NC (i.e. DP1)? And is D-C less bellicose than either I-C and/or E-C (i.e. DP2)?

Table 3: No deliberation
Averages in tokens; standard deviations in parentheses

	Democracy	Inclusive	Extractive
Investment in Conflict	51.08 (19.92)	35.58 (21.63)	42.17 (17.70)
Contributions to Public Good	33.47 (23.10)	38.23 (23.99)	43.72 (19.09)
Dictators	--	32.63 (25.93)	51.83 (19.90)
Non-dictators	33.47 (23.10)	41.03 (22.86)	39.68 (17.61)
Earnings	182.38 (54.80)	202.65 (40.00)	201.55 (60.54)
Dictators	--	208.26 (43.57)	237.38 (71.86)
Non-dictators	182.38 (54.80)	199.85 (38.51)	183.64 (45.43)

Standard deviations use individual averages across all 20 rounds (one observation per individual)

Table 3 gives the summary statistics for D-NC, I-NC and E-NC comparisons. In contrast to the prediction in Table 2, in the absence of deliberation, investments in the conflict are larger in the democracy (D-NC) than in both types of dictatorships (I-NC and E-NC). The figure for D-NC is close to the prediction of 50 in Table 2, but for I-NC and E-NC, they are clearly below the predictions of 50 and 75, respectively, but with I-NC being below E-NC, which is consistent with the relative predictions in Table 2. Contrary to the prediction, public good contributions are

sizeable in all three cases and lower in democracy than in dictatorships. Earnings are higher (and about the same) in the two dictatorships than in democracy, with approximate earnings equality between dictator and citizens in I-NC and the dictator earning more than the citizens in E-NC.

Table 4: Investment in Conflict
(NC Treatments: No deliberation/chat)

	[1] Group Investment	[2] Team Investment	[3] Team Investment	[4] Team Investment
Inclusive (I)	-117.8* (61.71)	-58.89* (30.78)	-57.36** (26.26)	-58.60** (27.26)
Extractive (E)	-104.8** (51.60)	-52.42** (25.73)	-44.89** (21.14)	-46.21** (21.61)
Period (D)	-7.326** (3.680)	-3.663** (1.835)	-2.887** (1.292)	-2.990** (1.342)
Period (I)	-4.968*** (1.604)	-2.484*** (0.800)	-1.448*** (0.477)	-1.482*** (0.539)
Period (E)	-2.431 (2.093)	-1.216 (1.044)	0.0357 (0.602)	-0.0566 (0.681)
L (winning)	--	--	-4.414 (5.158)	-6.748 (5.474)
L (Public)	--	--	-0.461*** (0.0670)	-0.423*** (0.0762)
L (C above)	--	--	--	0.0624 (0.0812)
L (C below)	--	--	--	-0.0519 (0.0882)
Constant	383.4*** (38.52)	191.7*** (19.21)	232.8*** (18.83)	231.0*** (20.45)
Observations	480	960	912	912
# Teams (n=3)	48	48	48	48
# Groups (n=6)	24	24	24	24

Robust standard errors clustered at the group level in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Model [1] uses one observation per group and period,
models [2] to [4] one observation per team and period
{p-values of coefficient Inclusive in models [1] and [2] 0.056 and 0.056}

Table 4 shows the results of regressions of conflict investment on D-NC, I-NC and E-NC, with D-NC as the omitted governance category. Dummy variables I and E indicate treatments I-

NC and E-NC. In all specifications we include period dummies interacted with the different treatment variables (i.e., Period (E), Period (I), Period (E)) to detect different dynamics across governance arrangements. We show specification with and without a set of appropriate standard contest controls for prior outcomes and decisions (i.e., a dummy for whether the group won the prize in the last period (L(winning)), the lagged public good contributions of the group (L(public)) and dummies in the second equation for whether the group made an investment contribution above (L (C above)) or below (L (C below)) their opponent group in the last period, (see Sheremata 2018).

Thus, the investment in conflict in D-NC is larger than both I-NC and E-NC in Table 3, and the coefficients on the dummy variables dummies for I and E in Table 4 are both statistically significant in all four specification: I-NC and E-NC both invest significantly less than D-NC, regardless of whether we include control variables or not. Result 1 follows.

Result 1 (against the Democratic Peace causal thesis DPI): *the investment in conflict is significantly larger in D-NC than in I-NC and E-NC*

With respect to the dynamics we see significant downward trends in both D-NC and I-NC (somewhat weaker in the latter case) and no significant trend in E-NC.

Table 5: Deliberation
Averages in tokens; standard deviations in parentheses

	Democracy	Inclusive	Extractive
Investment in Conflict	34.29 (13.38)	41.83 (10.56)	31.83 (18.05)
Contribution to Public Good	58.79 (16.61)	52.34 (15.07)	63.92 (21.16)
Dictators	--	53.38 (15.67)	66.18 (19.06)
Non-dictators	58.79 (16.61)	51.83 (14.96)	62.78 (22.34)
Earnings	224.50 (41.38)	210.51 (41.17)	232.08 (71.47)
Dictators	--	209.48 (42.69)	266.08 (84.68)
Non-dictators	224.50 (41.38)	211.03 (40.99)	215.09 (58.14)

Standard deviations computed using individual averages across all 20 rounds (one observation per individual)

We turn now to the same comparison of governance types with deliberation/chat. Table 5 gives the same summary data for D-C, I-C and E-C. In contrast to what we saw in Table 3, D-C is now less bellicose than I-C and about as bellicose as E-C. All values for conflict investment are below the incentive theoretical predictions. Public good contributions are higher than in the absence of deliberation for all three governance arrangements. Earnings are also higher for all three arrangements, with earnings of the citizens being highest in democracy.

Table 6: Investment in Conflict
(Deliberation/chat)

	[1] Group Investment	[2] Team Investment	[3] Team Investment	[4] Team Investment
Inclusive (I)	54.81 (34.16)	27.41 (17.04)	34.81** (14.35)	33.88** (13.71)
Extractive (E)	-12.41 (41.98)	-6.203 (20.93)	4.078 (21.82)	6.941 (20.68)
Period (D)	-5.706*** (1.549)	-2.853*** (0.773)	-0.568 (0.770)	-0.495 (0.734)
Period (I)	-6.616** (3.260)	-3.308** (1.626)	-2.159** (1.079)	-2.075* (1.066)
Period (E)	-5.926** (2.793)	-2.963** (1.393)	-1.029 (1.347)	-1.085 (1.341)
L (Winning)	--	--	-1.362 (3.942)	2.152 (3.963)
L (Public)	--	--	-0.396*** (0.0455)	-0.443*** (0.0464)
L (C above)	--	--	--	-0.163** (0.0656)
L (C below)	--	--	--	-0.0287 (0.0460)
Constant	265.6*** (22.23)	132.8*** (11.09)	176.4*** (13.68)	187.8*** (12.88)
Observations	500	1,000	950	950
# Teams (n=3)	50	50	50	50
# Groups (n=6)	25	25	25	25

Robust standard errors clustered at the group level in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Model [1] uses one observation per group and period,
models [2] to [4] one observation per team and period
{p-values of coefficient Inclusive in models [1] and [2] 0.109 and 0.108}

Table 6 gives group level regressions on conflict investments with deliberation using the same controls as before. It is apparent in the Table 5 that D-C is now less bellicose than I-C and the dummy on I in Table 6 is significant and positive in the two specification with controls, whereas in the specification without controls they are also positive but not significant. The coefficient on the dummy variable for treatment E is not significant in any of the specifications. The coefficient for treatment I is shy of statistical significance in the first two models ($p=0.109$ and $p=0.108$, respectively) but is significantly different from D in the last two specifications, including controls. We believe that the results in the specifications with controls have to carry more weight. Result 2 follows.

Result 2 (in support of Democratic Peace causal thesis DP2): investment in conflict is significantly lower in D-C than in I-C (when specification includes controls) and it is not significantly different in D-C from that in E-C.

We note in passing, for future reference, that the lagged public goods contribution coefficient is significant, negative and of similar values in both Tables 4 and 6, suggesting that high public goods contributions tend to be associated with lower conflict investments.

Results 1 and 2 document that in our data the democratic peace causal thesis holds only in the presence of deliberation. Table 7 reinforces this conclusion. Here, we examine the effect of deliberation on each governance arrangement separately for conflict investment, contributions to the public good and surplus, defined as earnings minus initial endowment (i.e. we now perform the horizontal comparison in our 3x2 design). The dummy for deliberation is negatively significant only in model (1) in the top Conflict panel of Table 7, and positively significant at the 5% level ($pvalue=0.032$) in the bottom Surplus panel of the same table.⁸ Deliberation significantly decreases investment in conflict and significantly increases the surplus obtained in the experiment only in democratic groups. Result 3 follows.

Result 3: Deliberation only significantly lowers conflict investment in D.

⁸ The p-value of dummy Deliberation in model [2] is far from significant for Conflict ($p-value=0.445$). While the model estimates a 27% reduction of investment in conflict in Democracy ($p-value=0.038$), the same model estimates a 14% and a 21% reduction of Conflict in Inclusive and Extractive dictatorships, respectively.

Table 7: Influence of deliberation/chat by type

	(1) D	(2) I	(3) E
Investment in Conflict			
Period	-6.516*** (2.025)	-5.841*** (1.909)	-4.179** (1.819)
Deliberation	-100.8** (48.65)	37.51 (49.11)	-62.02 (47.41)
Constant	374.9*** (35.67)	274.8*** (49.79)	296.9*** (35.37)
Contributions to Public Good			
Period	1.046*** (0.327)	0.711** (0.340)	0.792*** (0.265)
Deliberation	25.32*** (7.616)	14.11** (6.611)	20.19** (8.033)
Constant	22.48*** (5.195)	30.77*** (6.699)	35.41*** (5.217)
Surplus			
Period	2.132*** (0.643)	1.684*** (0.646)	1.488*** (0.558)
Deliberation	42.12*** (15.27)	7.860 (13.96)	30.53* (15.72)
Constant	-40.00*** (10.82)	-15.03 (14.22)	-14.07 (11.04)
Observations	320	340	320
# Groups (n=6)	16	17	16

3. 2. Causal mechanisms

Recall that, with the incentive causal mechanism VIP, we do not expect any difference from ‘voting’ between D and I. Result 1 and 2 combine against this ‘voting’ prediction because conflict in D-NC is significantly greater than I-NC and conflict in D-C is significantly less than I-C (with controls). In short, the evidence counts against the VIP: voting has effects, even if they are opposite ones under chat and no-chat. Result 4 follows.

Result 4 (against VIP): ‘voting’ affects conflict significantly, D-NC is greater than I-NC and D-C is less than I-C;

With respect to IIP (‘inclusivity’ reduces bellicosity), we compare I and E because the only change between E and I is inclusivity. In all regression specification shown in Table 4 the

coefficients on I and E are negative and significant, inconsistent with IIP, that the absence of ‘inclusivity’ in E does conflict. In Table 6 we can see that when there is deliberation/chat the coefficient on I is, in the regressions with controls significantly positive, whereas the coefficient on E is never significant. In specifications without controls both dummies are not significant. Observe, however, that the coefficients on I are positive while the ones on E are negative, so that in qualitative terms, the results of all specification in Table 6 count against IIP. Result 5 follows.

Result 5 (mixed on IIP): ‘inclusivity’ raises conflict investment when there is deliberation (I-C is greater than E-C); but ‘inclusivity’ does not affect conflict investment when there is no deliberation/chat (I-NC is not different from E-NC).

Finally we examine their possible joint influence (V+IIP) through the comparison of D with E. Again, these are covered by the combination of Result 1 and 2 and we restate them explicitly in Result 6.

Result 6 (against V+IIP): ‘voting’ and ‘inclusivity’ raise conflict investment when there is no deliberation/chat (conflict investment in D-NC > E-NC); and ‘voting’ and ‘inclusivity’ have no effect on conflict investment when there is deliberation/chat (conflict investment D-C is not different from E-C).

We turn now to the behavioral causal mechanisms related to differences in public good contributions. This is a potentially promising causal route because, as we have seen, lagged public goods contributions are negatively associated with conflict investments in Tables 4 and 6. We start with TRP, the team reasoning causal prediction, and VBP, the voting behavioral prediction. Table 3 shows that average contributions to the public good are smaller in D-NC than I-NC and smaller than those in E-NC. Table 5 has the reverse rankings.

Table 8 shows the results of a regressions of individual contributions to the public good, without and with chat, on governance dummies (I, and E, with D as omitted governance arrangement), period interacted with governance, and the standard controls that are used in such equations: whether the team won last round, (L(Winning)), whether conflict investments were above or below the opponent team last round (L(C Above) and L(C Below)), whether individual contributions to the public good were above or below the average last round (L(P Above) and L(P Below)), and for lagged Cohesion, which we define as the standard deviation of earnings in the team last round (L(Cohesion)). Without chat, the coefficient on the I dummy is weakly

positive in equation 1. With chat, neither treatment dummy is significantly different from zero. Result 7 follows.

Result 7 (against TRP and VBP): *There is no evidence that public goods contributions are higher in D-NC than I-NC or E-NC, likewise there is no evidence that public good contributions are higher in D-C than I-C or E-C.*

Table 8: Public good contributions

	No chat	Chat
Inclusive	12.59* (7.604)	-7.63 (7.338)
Extractive	14.83** (7.383)	7.461 (8.462)
Period (D)	0.789 (0.491)	0.991*** (0.255)
Period (I)	0.168 (0.294)	1.036** (0.451)
Period (E)	0.429 (0.369)	0.774** (0.395)
L (Winning)	2.128 (1.757)	0.293 (1.323)
L (Cohesion)	0.0192 (0.149)	-0.902*** (0.169)
L (C Above)	-0.0309 (0.0218)	-0.00626 (0.0195)
L (C Below)	0.0618* (0.0338)	0.0584*** (0.0208)
L (P Above)	0.130* (0.0666)	0.767*** (0.283)
L (P Below)	-0.261*** (0.0411)	0.232* (0.139)
Constant	23.48*** (6.085)	48.82*** (5.501)
Observations	2,736	2,850
# subjects	144	150

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Lastly, we move to evaluating the Mill behavioral causal prediction (MBP). Table 7 middle panel shows that public goods contributions are indeed boosted by deliberation in D, I and E and D has the biggest boost, but one can not directly compare the impact of the three governance arrangements in statistical terms.

However, in the individual level regressions in Table 8 one can see that, whereas public goods absolute contributions are significantly higher in E-NC and weakly so in I-NC than D-NC, there are no significant differences in between D-C, I-C and E-C. Thus the difference between D and I, and D and E without deliberation disappears with deliberation in the individual level data.

***Result 8** (partial support for the MBP): deliberation has a bigger effect on public good contributions in D than in I and E in the individual level data, but the aggregate data differences, while similarly suggestive, are not significant.*

4. Discussion

These results are in many respects consistent with others that have been found in the experimental literature. For example, the general positive effect revealed in Table 7 of ‘chat’ on contributions to the public good is a common finding (Ostrom et al. 1992). We find like others that inequality has a negative effect on contributions to the public good (see coefficients on Cohesion variable in Table 8. The one respect in which the results are different is the absence of any clear overinvestment in conflict. Overinvestment is a typical result in the contest literature, especially for teams,⁹ whereas the reverse is the case here. This may be because, unlike many contest experiments, resources not used in the contest in our setting can be used productively in the public good (that is, when used here, they double in value). This only matters in E when individuals are selfish. But it will matter in D and I too if individuals are pro-social and so expect to make contributions to the public good; and of course, they do, and more strongly so under deliberation. In this context, our ‘unusual’ result, of lower investments in the conflict than the selfish Nash predictions, is not so surprising. It is predicted by pro-sociality (e.g., see the team

⁹ See Abbink et al., 2010 and Fallucchi et al., 2020. Fallucchi et al., 2020 compare the predictions of a standard model with the ones arising from alternatives, including competitive preferences, joint payoff maximizing and asymmetric inequity aversion. All alternative models predict investment above the standard one, and being the asymmetric inequity aversion the closer to the data.

reasoning prediction in Table 2).¹⁰

We turn now to the implications of these results for the Democratic Peace causal thesis. Overall, we conclude that there is mixed evidence in support of it. Democracies, identified by governance via 'voting' and 'inclusivity' as well as 'deliberation', are less bellicose than the dictatorships that are distinguished from D-C only because they do not have voting (i.e., I-C) and they are no more bellicose than those dictatorships where there is neither voting nor inclusivity (i.e., E-C): see Result 2. But the opposite holds when there is no deliberation, democracies are more bellicose than all dictatorships: see Result 1. In other words, deliberation is crucial for democracies if their 'voting' and 'inclusive' governance structure is to be a causal contributor to peace. This insight is reinforced by Result 3, where we find that deliberation only lowers bellicosity under democracy (i.e., in combination with 'voting' and 'inclusivity').

Thus, there is no evidence to support the idea that any one feature that can be associated with democracy has a causal impact on peace. This is because neither the 'voting' change by itself (D-NC compared with I-NC) reduces conflict investment (Result 1) nor the 'inclusivity' change by itself (I-NC compared with E-NC, see Table 4) reduces conflict investment. Furthermore, the combination of 'voting' together with 'inclusivity' (D-NC compared E-NC) does not reduce conflict investment (Result 1). It takes the combination of all three features, 'voting, 'inclusivity' and deliberation for democracy to reduce conflict investment (Result 2). For this reason, it is tempting to conclude that the evidence supports both Rosato's (2003) negative claim about the influence of single features and Doyle's (2005) positive counter conjecture that the causal effect depends on their conjunction.

Our evidence on the causal mechanisms is in comparison relatively weak. We hypothesized a variety of institutional/incentive and preference change/norm based behavioral mechanisms. There is little evidence to support the institutional/incentives causal mechanism. This is also consistent with the only other experiment, as far as we know, to have examined explicitly the bellicosity of democracies as compared with dictatorships: Bausch (2017). He has a more complex experiment where democratic and dictatorial leaders must first decide whether to enter a conflict and then if they do, they must decide how much and where to commit resources

¹⁰ This is an interesting insight because it suggests that overinvestment may arise in contest experiments in general because such investments disproportionately 'catch the eye' of subjects when they are productive unlike, funds kept in a private account. Subjects have no alternative use of their funds.

in a Blotto game. The only governance difference in that set-up concerns re-election. Both democratic leaders and dictators face re-election but the threshold for re-election is lower under a dictatorship. This is an institutional difference that affects incentives. He finds that democratic leaders are more likely to enter a conflict but there is no evidence that they behave significantly differently once they have entered. In short, a different re-election constraint does not make democratic leaders more peaceful either in terms of the likelihood of entering a conflict or behavior once in a conflict.

In contrast, our evidence supports one of the behavioral mechanisms that we test: the Mill behavioral prediction (MBP), whereby deliberation has a more powerful positive effect on the pro-sociality driving public goods contributions in democracies than dictatorships. This also fits with the evidence we have noted that lagged public goods contributions have a negative effect on conflict investment. This mechanism, however, cannot by itself explain why conflict investment is lower in D-C than I-C because although deliberation has the more powerful and significant positive effect on public goods contributions in D than I (at least in the individual level data), there is no significant difference between the absolute level of public goods contributions in D-C and I-C and it is this absolute value that influences the opportunity cost of conflict. Deliberation, in this sense, closes the pre-deliberation gap in public goods contributions between D-NC and I-NC, but it does not create the differences in the opportunity cost of conflict which could explain why D-C invests less in conflict than I-C. Deliberation, therefore, must do something more to open the gap in conflict investment between D-C and I-C.

One idea in the democratic peace literature we did not formally develop ex-ante is that the practice of resolving disputes peacefully via the deliberation and the ballot box encourages a more general convention or norm of peaceful dispute resolution in democracies and this norm is extended to relations with other democracies. We did not develop this because in our rational choice framework, it amounts to conjecturing that people develop over time a preference for resolving disputes peacefully when a conflict arises with a fellow democratic team. This is not a satisfactory explanatory strategy if the only evidence of such a change is, in fact, the change in behavior that needs explaining. Furthermore, there seems to be no reason to suppose that such a change in preferences only occurs when democracy has the deliberation feature.

Nevertheless, there is some other evidence that is, so to speak, independent of what needs to be explained and which supports this idea of an inter-democratic convention/norm of peace

developing only when there is deliberation. If the behavior of the contesting teams becomes more alike over time, then this would be evidence of a developing convention/norm. We develop exploratory analysis to consider whether this is the case in Table 9 and Table 10 by disaggregating the earlier regressions on conflict by governance types and testing whether the investment in conflict is sensitive to whether it was previously above or below the opponent's investment.¹¹ A convention/norm in the sense of a similarity in behavior would develop, therefore, if both teams respond to being above the opponent's in the last period by cutting back and responding to being below in the previous period by increasing investment. These are the adjustments that are broadly necessary for a convergence in behavior.

**Table 9: Between-teams' bellicosity
(No deliberation/chat)**

	[1]	[2]	[3]	[4]	[5]	[6]
	D	I	E	D	I	E
Period	-0.711 (0.84)	0.509 (0.474)	0.932 (0.671)	-1.307 (0.924)	0.232 (0.301)	0.334 (0.678)
L (above)	-0.0493 (0.129)	-0.560*** (0.101)	-0.283 (0.182)	-0.0058 (0.157)	-0.479*** (0.129)	-0.0855 (0.168)
L (below)	0.533** (0.271)	0.263*** (0.102)	0.216** (0.0928)	0.4048* (0.2381)	0.223** (0.0928)	0.099 (0.0688)
L (conflict)	--	--	--	-0.1718* (0.0925)	-0.126** (0.0596)	-0.214*** (0.0686)
L (winning)	--	--	--	5.944 (7.868)	-0.543 (3.8)	-15.41 (11.14)
L (cohesion)	--	--	--	0.3942 (0.566)	-0.109 (0.344)	0.563* (0.328)
Constant	-10.48 (20.02)	-1.611 (7.295)	-7.824*** (2.336)	18.8979 (17.57)	16.05* (8.978)	22.75 (13.94)
Observations	304	304	304	304	304	304
#groups (n=6)	8	8	8	8	8	8

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.

¹¹ Tables 9 and 10 follow the conditional cooperation literature in that individuals and teams condition their behavior to the observed behavior of others (see Croson et al, 2005, 2015 for individuals in a variety of games, and Croson et al 2020 for an experimental analysis of conditional behavior between teams). Fatas et al (2010 and 2020) follow a similar approach to the one used in Tables 9 and 10 studying conditional behavior when lagged decisions were above or below the behavior of a reference group. Fallucchi et al (2020) studies conditional behavior in Tullock's contests.

It is apparent in Table 9 that, with no deliberation/chat, there is only evidence of a norm in this sense in I-NC; this holds without and with controls. In D-NC (like E-NC, with but not without controls) there is only a ratcheting up when previously below the opponent's spend, there is no ratcheting down when above. In contrast, In Table 10 one can see that with deliberation, D-C like I-C (and E-C) now adjusts conflict spending in a convention/norm-like manner in both directions. Furthermore, the upward adjustment has become notably weaker in D-C than it was in D-NC. So, the emergence of an inter-team convention/norm through deliberation has a distinctly peaceful character to it in Ds.

**Table 10: Between-teams' bellicosity
(Deliberation/chat)**

	[1]	[2]	[3]	[4]	[5]	[6]
	D	I	E	D	I	E
Period	0.657*	-0.329	0.504	-0.154	-1.729**	0.0555
	(0.382)	(0.598)	(0.499)	(0.673)	(0.88)	(0.702)
L (above)	-0.492***	-0.512***	-0.476***	-0.343**	-0.346***	-0.312**
	(0.115)	(0.0612)	(0.154)	(0.144)	(0.0626)	(0.133)
L (below)	0.323***	0.146***	0.153**	0.211***	-0.0927	0.132**
	(0.1)	(0.038)	(0.0776)	(0.078)	(0.0689)	(0.0615)
L (conflict)	--	--	--	-0.330**	-0.396***	-0.192**
				(0.136)	(0.0736)	(0.0952)
L (winning)	--	--	--	12.80**	-1.42	-0.907
				(6.384)	(4.576)	(6.049)
L (cohesion)	--	--	--	1.127*	0.0627	-0.387
				(0.644)	(0.44)	(0.291)
Constant	-5.987	12.62***	1.65	26.37	80.82***	22.24
	(4.664)	(4.68)	(2.988)	(17.11)	(12.22)	(16.68)
Observations	304	342	304	304	342	304
#groups (n=6)	8	9	8	8	9	8

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

There is one further finding regarding the effect of deliberation worth drawing out. It won't explain the divergence between D-C and I-C, but it is interesting nevertheless. Deliberation transforms Cohesion within teams. Table 11 sets this out. Cohesion (as measured by the average standard deviation of contributions to the public good and in earnings in each team, so that a low number indicates greater cohesion, or less inequality) drops markedly in all

governance arrangements with deliberation. Democracies are still more equal than dictatorships with deliberation but the absolute level of inequality and the differences between democracies and dictatorships were much larger when there was no deliberation. ¹²

Table 11: Cohesion:
Average Standard Deviation of Public Goods Contributions and of Earnings

	Public Goods Contributions		Earnings	
	No deliberation	Deliberation	No deliberation	Deliberation
Democracy	9.75 (7.16)	3.11 (3.89)	19.88 (19.92)	6.59 (14.90)
Inclusive	16.94 (10.41)	4.19 (5.63)	20.93 (17.01)	10.85 (18.24)
Extractive	13.69 (8.05)	4.10 (8.22)	76.59 (113.24)	47.66 (107.40)

5. Conclusion

The Democratic Peace causal thesis has influenced US foreign policy, and its underlying logic plausibly has wider significance for the choice of governance arrangements in any collectivity. We test whether three features of what is understood as democracy have a causal impact on peace as judged by investment in a contest over a prize: ‘voting’, ‘inclusion’ and ‘deliberation.’ Neither ‘voting’ nor ‘inclusion’ nor ‘deliberation’ in isolation has a positive causal impact on peace in our experiment. However, when all three are combined, there is evidence that their combination produces less bellicosity than some kinds of dictatorship. It is the addition of deliberation that makes the crucial distinguishing difference for democracy in our experiment. Since deliberation also seems to produce more cohesion in the sense of less inequality in all governance arrangements, it seems that deliberation is rather a good thing.

We not only test for a causal relation between these features of democracy and peace, we also test 2 types of causal mechanism. There is virtually no evidence that the incentive

¹² Running a robust panel data regression with period and treatment dummies Earnings and PG equality is significantly higher (and the standard deviation lower) in Democracies than in Inclusive dictatorships without deliberation (at the 5% level). Only earnings equality is significantly higher in Democracies than in Extractive dictatorships without deliberation (at the 1% level).

mechanisms in our experiment by themselves explain our results: that is, there is no evidence that the change in incentives resulting from a change in governance arrangements predictably affects bellicosity. But there is some evidence that a behavioral mechanism explains our results to some degree. In particular, it seems that deliberation does encourage two types of pro-sociality. First, deliberation encourages pro-sociality within a team and this leads to larger contributions to the public good. In turn, this raises the opportunity cost of conflict and so discourages bellicosity. Second, there is some evidence of an encouragement to a peaceful convention/norm between teams that comes both through deliberation when there is voting and inclusivity, but it is strongest in dictatorships.

References

- Abbink, Klaus, Jordi Brandts, Benedikt Herrmann, and Henrik Orzen, "Intergroup Conflict and Intra-group Punishment in an Experimental Contest Game," *American Economic Review* 100 (2010), 420-47.
- Acemoglu, D, and J. Robinson (2012): *Why Nations Fail: the origins of power, prosperity and poverty*. New York: Crown Publishers
- Bausch, A. (2017): "Democracy and War Effort: An Experiment". *Journal of Conflict Resolution*, 61(4), 814-838.
- Bowles, S. and Polania-Reyes, S. (2012): "Economic incentives and social preferences: Substitutes or complements?" *Journal of Economic Literature*, 50(2), 368–425.
- Brandts, J., L. Gerhards and L. Mechtenberg (2019): "Deliberative Structures and their Impact on Voting Behavior under Social Conflict." Barcelona GSE Working Paper 1022, revised May 2019.
- Buchanan, J. and R. Congleton (1998) *Politics by principle, not interest: toward nondiscriminatory democracy*. Cambridge: Cambridge University Press.
- Bush, G. (2004): Transcript of Bush and Blair Press Conference, 12 November.
- Cason, T. N., & Plott, C. R. (1996). EPA's new emissions trading mechanism: a laboratory evaluation. *Journal of environmental economics and management*, 30(2), 133-160.
- Clinton, W. J. (1994): Address Before a Joint Session of the Congress on the State of the Union. <http://www.presidency.ucsb.edu/ws/index.php?pid=50409>, (1994).
- Croson, R., & Gächter, S. (2010). The science of experimental economics. *Journal of Economic Behavior & Organization*, 73(1), 122-131.
- Croson, R., Fatas, E., & Neugebauer, T. (2005). Reciprocity, matching and conditional cooperation in two public goods games. *Economics Letters*, 87(1), 95-101
- Croson, R., Fatas, E., Neugebauer, T., & Morales, A. J. (2015). Excludability: A laboratory study on forced ranking in team production. *Journal of Economic Behavior & Organization*, 114, 13-26
- Croson, R., Fatas, E. and Neugebauer, T. (2020): Within- and Between-Team Competition. An Experiment on Team Incentives, mimeo.
- Dal Bó, P., A. Foster, and L. Putterman (2010): "Institutions and Behavior: Experimental Evidence on the Effects of Democracy." *American Economic Review* 100 (5): 2205–2229.
- De Tocqueville, A. (1840): *Democracy in America*, Saunders and Otley, London.
- Diamond, L. (2016): *In Search of Democracy*. Routledge: London.
- Dixon, W. J. (1994): "Democracy and the peaceful settlement of international conflict", *American Political Science Review* 88, 14-32, (1994).
- <http://www.nytimes.com/2004/11/12/international/middleeast/bush-and-blair-discuss-the-mideast.html?mcubz=0>, (2004).
- Fallucchi, F., E. Fatas, F. Kolle and O Weisel (2020): "Not all groups were created equal. Heterogeneous abilities in intergroup contests", *Experimental Economics*, forthcoming.

- Fatas, E., Meléndez-Jiménez, M. A., & Solaz, H. (2010). An experimental analysis of team production in networks. *Experimental Economics*, 13(4), 399-411.
- Fatas, E., Meléndez-Jiménez, M. A., & Solaz, H. (2020). Social hierarchies: a laboratory study on punishment patterns across Networks. *Economic Inquiry*, 58(1), 104-119.
- Fischbacher, Urs. "z-Tree: Zurich toolbox for ready-made economic experiments." *Experimental economics* 10, no. 2 (2007): 171-178.
- Gastil, J. (2018): "the lessons and limitations of experiments in democratic decision making", *Annual Review of Law and Social Science*, 14, 271-291.
- Hargreaves Heap, S., Tsutsui, K, and D. Zizzo (2020): "Vote and voice: an experiment on the effects of inclusive governance rules", *Social Choice and Welfare (forthcoming)*.
- Isaac, R. Mark, and James M. Walker, "Group size effects in public goods provision: The voluntary contributions mechanism," *The Quarterly Journal of Economics* 103 (1988), 179-199.
- Kant, I. (1795/1957): *Perpetual peace*, translated by White Beck (1957). The Library of Liberal Arts, Bobbs-Merrill.
- Karpowitz, C.F. and T. Mendelberg (2011): *Cambridge Handbook of Experimental Political Science*, An experimental approach to citizen deliberation, pp. 258-272. Cambridge University Press. Cambridge.
- Ketcham, J., Smith, V. L., & Williams, A. W. (1984). A comparison of posted-offer and double-auction pricing institutions. *The Review of Economic Studies*, 51(4), 595-614.
- Lake, D. A. (1992): "Powerful pacifists: Democratic states and war". *American Political Science Review* 86, 24-37, (1992).
- Levy, G. and R. Razin (2004): "It takes two: An explanation for the democratic peace", *Journal of the European Economic Association* 2, 1–29.
- Levy, J. S. (2002): "War and peace". In *Handbook of International Relations*, edited by W. Carlsnaes, T. Risse, B. A. Simmons, Eds., Sage, 350–368.
- Makrund, S. & Rodrik, D (2015) "The Political Economy of Liberal Democracy", *NBER Working Paper 21540*.
- Myers, C.D. and T. Mendelberg (2013): *Oxford Handbook of Political Psychology*, pp. 699-734. Oxford University Press.
- Ostrom, E., Walker, J., & Gardner, R. (1992). Covenants with and without a sword: Self-governance is possible. *American political science Review*, 86(2), 404-417.
- Pateman, C. (1970): *Participation and democratic theory*. Cambridge University Press.
- Raknerud, A. (1997): "The hazard of war: Reassessing the evidence for the democratic peace". *Journal of Peace Research* 34, 385-404 (1997).
- Rosato, S. (2003): The flawed logic of democratic peace. *The American Political Science Review* 97, 585-602, (2003).
- Schmidt, K. M. (2009). The role of experiments for the development of economic theories. *Perspektiven der Wirtschaftspolitik*, 10, 14-30.

Sheremeta, R. (2018) “Behavior in group contests: A review of experimental research,” *Journal of Economic Surveys*, 32(3), 683-704.

Sugden, R. (2005). Experiments as exhibits and experiments as tests. *Journal of Economic Methodology*, 12(2), 291-302.

Sutter, M. and C. Strassmair (2009): “Communication, cooperation and collusion in team tournaments—An experimental study.” *Games and Economic Behavior* 66(1): 506-525.

Sutter, M., S. Haigner, and M. G. Kocher (2010): “Choosing the carrot or the stick? Endogenous institutional choice in social dilemma situations.” *Review of Economic Studies*, 77(4): 1540-1566.

Tullock, G. (1967): “The welfare costs of tariffs, monopolies and thefts,” *Western Economic Journal* 5, 224-232, (1967).

Tullock, G. (1980): “Efficient rent-seeking”. In: J. Buchanan, R. Tollison, G. Tullock, Eds., *Towards a theory of the rent-seeking society*, College Station, Texas A&M University Press, 97-112.

Wilson, W. (1917): Address to the Joint Session of Congress Requesting the Declaration of War against Germany. <http://www.presidency.ucsb.edu/ws/index.php?pid=65366>, (1917).

APPENDIX

All instructions as shown on screen

1. Instructions for Democracy (D).

Introduction

Welcome to our experiment. Please read the following instructions carefully. During the experiment you have to make various decisions that can earn you real money. Please, keep quiet during the entire experiment and if you have a question at any point in the experiment, just raise your hand.

All participants in the experiment have received the same set of instructions.

Assignment to a group

At the beginning of the experiment, participants are randomly assigned to groups of 3 people. You will stay in the same group for the entire experiment.

Earnings

Each person receives an initial endowment of 100 experimental points. These points will be used to make decisions, and you will earn additional points during the experiment. Points will be converted to dollars at the end of the experiment at the rate of 10 points = 1 dollar.

Decisions

Groups make two decisions in each round. The first is a group competition decision over how much (the same amount for each member) to place into a group competition fund. The winner of the group competition wins a prize. The second is an individual decision over how much of what remains of the individual endowment to invest, either in a private account or in a joint group account. There are 20 rounds of decision making.

Group competition

The first decision in each round is a group decision to determine how much each group member will place in the group competition fund. This fund will be used to compete with another group. The amount placed in the fund is the same amount for each individual in a group.

All group members participate in the decision over the individual contribution level. Each group member proposes an individual contribution level and the group choice is the median proposal– the one in the middle. For example, if the three group members propose 10, 40 and 50, the median proposal is 40 and so everyone contributes 40 points with the result that the group competition fund has 120 points.

The other group that you are matched with also must determine how much to place in the group competition fund. Their decision is made in the same way.

Group Competition, Continued

Each group is randomly paired with another group in a competition for a prize. The same groups are paired together for each of the 20 rounds. The winning group in each round gets a prize of 500 600 points and this is shared equally among the members of the group. Each group knows the type of group (H or D) they belong to and the type of group (H or D) they are paired with. The probability of a group winning the prize depends on the size of its competition fund relative to that of the group it is paired with. The bigger the group's competition fund relative to the other, the higher is the chance that it wins the prize. In particular, the probability that your group wins against the other group is given by:

$$\frac{\text{Your Competition Fund}}{(\text{Your Competition Fund} + \text{Other Group's Competition Fund})}$$

Group Competition: Example

EXAMPLE: Suppose that your group's competition fund is 120 points, and the other group's competition fund is 40 points. The probability that you wins the prize is $120/(120+40) = 0.75$; and the probability that B wins the prize is $40/(120+40) = 0.25$. Note that if both funds are the same size, then your chance of winning is .50.

The computer will draw a random number to determine who wins the competition.

Individual Decision

The second decision concerns what remains of an individual's endowment after the group competition decision. Each individual decides how much of this residual to invest in a private account and how much to invest in a joint account with other group members. Every point that you invest in the private account returns one point to you. Every point that you invest in the joint account is doubled by the experimenter and then divided equally among all three members of your group.

EXAMPLE: Suppose the competition decision is a contribution of 40 points to the group competition fund. This leaves 60 endowment points for each individual in the group. Suppose that you allocate 20 to the joint account (and 40 into your private account) and the other two group members both allocate 30 to the group account (leaving 30 in their private accounts). The joint account therefore has an allocation of $20+30+30 = 80$. This doubles in value (to 160) and is shared equally. So you get 53.3 from the joint account. Your earnings will then be 40 from your private account, plus your share of the joint account, $40+53.3 = 93.3$ points.

Payoffs and information

At the end of each round, you will be told:

The size of your group's competition fund

The size of the competition fund for the group that you have been paired with

The winner of the competition

Your group members' decisions about how much to put in the group's joint account

Your total pay-off then has three parts:

your share of the prize (if your group wins)

+ your allocation to the individual account

+ your share of the joint account.

Your Actual Payoff

At the end of the 20 rounds, one round will be chosen at random. Your pay-offs in this round will be converted into dollars at the rate of ten points = \$1. The dollar earnings from this round, plus your show up fee, adds up to your pay-off from the experiment.

Before starting to make decisions, we ask you to fill in a questionnaire. The only purpose of the questionnaire is to check whether you have understood these instructions. When you have completed the questionnaire, please wait for the experimenter to come to check your answers.

Quiz questions

This question is about the Competition Fund. Suppose you suggest 60, and the other suggestions from your group are 3 and 47. What amount will be selected for each member to place in the Competition Fund?

_____.

How much will you have left for the individual decision? _____

This question is about the Individual Decision. Suppose your group decides to put 30 in the Competition Fund, leaving you with 70. Also suppose you put 20 into the group account, and the other group members put 15 and 25. What will be your share of the group account? _____ What will be your earnings from your private account? _____

Group Competition Decision

Recall that you and your group members each get to make a proposal for the amount to put in the Competition Fund. The median proposal will be implemented. There is no right or wrong decision; you should make the proposal you think is best.

My Proposal is _____. (Submit)

Group Competition Decision

You suggested ____, and the other suggestions were ____ and _____. The median suggestion is _____.

This amount is now deducted and put into the Competition Fund. You will find out later whether your group wins.

Individual Decision

Now you must decide how to divide your remaining funds, _____.

Each point invested in the private account returns one point to you.

Each point invested in the joint account is doubled by the experimenter and then evenly divided among all three group members.

Please indicate your allocation below (must add to your total remaining funds):

Private Account _____

Group Account _____

Competition

Your group put XX into the Competition Fund, and the other group put YY into the Competition Fund. The probability that your group will win is xx and that the other group will win is yy.

The computer has drawn a random number and determined that your group WINS/LOSES.

Earnings from the accounts

You put ZZ into your private account.

The total contributed to the joint account is AA. Therefore your share of the earnings from this account is $(AA*2)/3$.

Total Earnings

Your earnings for this round are as follows:

CC from your private account

DD from the joint account

EE from your share of the competition

Your total earnings this round _____

2. Instructions for have inclusive dictatorship (I):

Introduction

Welcome to our experiment. Please read the following instructions carefully. During the experiment you have to make various decisions that can earn you real money. Please, keep quiet during the entire experiment and if you have a question at any point in the experiment, just raise your hand.

All participants in the experiment have received the same set of instructions.

Assignment to a group

At the beginning of the experiment, participants are randomly assigned to groups of 3 people. You will stay in the same group for the entire experiment.

Earnings

Each person receives an initial endowment of 100 experimental points. These points will be used to make decisions, and you will earn additional points during the experiment. Points will be converted to dollars at the end of the experiment at the rate of 10 points = 1 dollar.

Decisions

Groups make two decisions in each round. The first is a group competition decision over how much (the same amount for each member) to place into a group competition fund. The winner of the group competition wins a prize. The second is an individual decision over how much of what remains of the individual endowment to invest, either in a private account or in a joint group account. There are 20 rounds of decision making.

Group competition

The first decision in each round is a group decision to determine how much each group member will place in the group competition fund. This fund will be used to compete with another group. The amount placed in the fund is the same amount for each individual in a group.

In your group, one member is randomly selected as the Group Decider and he or she decides in every round the amount that each group member places into the group competition fund. For example, if this person decides that 30 points per group member should be placed into the fund, then the group will have a competition fund of 90 points.

The other group that you are matched with also must determine how much to place in the group competition fund. Their decision is made in the same way.

Group Competition, Continued

Each group is randomly paired with another group in a competition for a prize. The same groups are paired together for each of the 20 rounds. The winning group in each round gets a prize of 600 points and this is shared equally among the members of the group. The probability of a group winning the prize depends on the size of its competition fund relative to that of the group it is paired with. The bigger the group's competition fund relative to the other, the higher is the chance that it wins the prize. In particular, the probability that your group wins against the other group is given by:

$$\frac{\text{Your Competition Fund}}{(\text{Your Competition Fund} + \text{Other Group's Competition Fund})}$$

Group Competition: Example

EXAMPLE: Suppose that your group's competition fund is 120 points, and the other group's competition fund is 40 points. The probability that you win the prize is $120/(120+40) = 0.75$; and the probability that B wins the prize is $40/(120+40) = 0.25$. Note that if both funds are the same size, then your chance of winning is .50.

The computer will draw a random number to determine who wins the competition.

Individual Decision

The second decision concerns what remains of an individual's endowment after the group competition decision. Each individual decides how much of this residual to invest in a private account and how much to invest in a joint account with other group members. Every point that you invest in the private account returns one point to you. Every point that you invest in the joint account is doubled by the experimenter and then divided equally among all three members of your group.

EXAMPLE: Suppose the competition decision is a contribution of 40 points to the group competition fund. This leaves 60 endowment points for each individual in the group. Suppose that you allocate 20 to the joint account (and 40 into your private account) and the other two group members both allocate 30 to the group account (leaving 30 in their private accounts). The joint account therefore has an allocation of $20+30+30 = 80$. This doubles in value (to 160) and is shared equally. So you get 53.3 from the joint

account. Your earnings will then be 40 from your private account, plus your share of the joint account, $40+53.3 = 93.3$ points.

Payoffs and information

At the end of each round, you will be told:

The size of your group's competition fund

The size of the competition fund for the group that you have been paired with

The winner of the competition

Your group members' decisions about how much to put in the group's joint account

Your total pay-off then has three parts:

your share of the prize (if your group wins)

+ your allocation to the individual account

+ your share of the joint account.

Your Actual Payoff

At the end of the 20 rounds, one round will be chosen at random. Your pay-offs in this round will be converted into dollars at the rate of ten points = \$1. The dollar earnings from this round, plus your show up fee, adds up to your pay-off from the experiment.

Before starting to make decisions, we ask you to fill in a questionnaire. The only purpose of the questionnaire is to check whether you have understood these instructions. When you have completed the questionnaire, please wait for the experimenter to come to check your answers.

Quiz questions

This question is about the Competition Fund. Suppose you are selected to be the Group Decider for your group. If you want there to be 120 in the Competition Fund, how much will each person (including you) place in the Fund?

_____.

How much will you have left for the individual decision? _____

This question is about the Individual Decision. Now suppose your Group Decider decides that everyone will put 30 in the Competition Fund, leaving you with 70. Also suppose you put 20 into the group account, and the other group members put 15 and 25. What will be your earnings from the group account? _____ What will be your earnings from your private account? _____

Group Competition Decision (The Dictator sees this one)

Recall that one person in your group is selected to be the Group Decider. That person determines the amount that all members of your group will put in the Competition Fund.

YOU have been selected as the Group Decider. You will retain this role for the rest of the experiment.

Group Competition Decision (Non-dictators see this one)

Recall that one person in your group is selected to be the Group Decider. That person determines the amount that all members of your group will put in the Competition Fund.

One of the other group members has been selected as the Group Decider. The Group Decider remains the same for the rest of the experiment.

Please wait while the Group Decider makes a decision

Group Decider Decision

Please indicate below how much you want each person to place into the Competition Fund this round. (Remember that the total placed in the Fund is three times this amount.)

There is no right or wrong decision; you should make the decision that you think is best.

My decision is _____.

(Submit)

Group Competition Decision

The Group Decider determined that each group member will place XX into the Competition Fund. This amount is now deducted and put into the Competition Fund. You will find out later whether your group wins.

Individual Decision

Now you must decide how to divide your remaining funds, _____.

Each point invested in the private account returns one point to you.

Each point invested in the joint account is doubled by the experimenter and then evenly divided among all three group members.

Please indicate your allocation below (must add to your total remaining funds):

Private Account _____

Group Account _____

Competition

Your group put XX into the Competition Fund, and the other group put YY into the Competition Fund.

The probability that your group will win is xx and that the other group will win is yy.

The computer has drawn a random number and determined that your group WINS/LOSES.

Earnings from the accounts

You put ZZ into your private account.

The total contributed to the joint account is AA. Therefore your share of the earnings from this account is $(AA*2)/3$.

Total Earnings

Your earnings for this round are as follows:

CC from your private account

DD from the joint account

EE from your share of the competition

Your total earnings this round _____

3. Instructions for extractive dictatorship (E)

Introduction

Welcome to our experiment. Please read the following instructions carefully. During the experiment you have to make various decisions that can earn you real money. Please, keep quiet during the entire experiment and if you have a question at any point in the experiment, just raise your hand.

All participants in the experiment have received the same set of instructions.

Assignment to a group

At the beginning of the experiment, participants are randomly assigned to groups of 3 people. You will stay in the same group for the entire experiment.

Earnings

Each person receives an initial endowment of 100 experimental points. These points will be used to make decisions, and you will earn additional points during the experiment. Points will be converted to dollars at the end of the experiment at the rate of 10 points = 1 dollar.

Decisions

Groups make two decisions in each round. The first is a group competition decision over how much (the same amount for each member) to place into a group competition fund. The winner of the group competition wins a prize. The second is an individual decision over how much of what remains of the individual endowment to invest, either in a private account or in a joint group account. There are 20 rounds of decision making.

Group competition

The first decision in each round is a group decision to determine how much each group member will place in the group competition fund. This fund will be used to compete with another group. The amount placed in the fund is the same amount for each individual in a group.

In your group, one member is randomly selected as the Group Decider and he or she decides in every round the amount that each group member places into the group competition fund. For example, if this person decides that 30 points per group member should be placed into the fund, then the group will have a competition fund of 90 points. If your group wins, the Group Decider determines how the prize is divided among the members of your group.

The other group that you are matched with also must determine how much to place in the group competition fund. Their decision is made in the same way. If they win, their Group Decider determines how the prize is divided.

Group Competition, Continued

Each group is randomly paired with another group in a competition for a prize. The same groups are paired together for each of the 20 rounds. The winning group in each round gets a prize of 600 points. The Group Decider gets to decide how the prize is shared. The Group Decider will first decide his/her own share, then the rest will be equally divided between the two remaining group members.

The probability of a group winning the prize depends on the size of its competition fund relative to that of the group it is paired with. The bigger the group's competition fund relative to the other, the higher is the chance that it wins the prize. In particular, the probability that your group wins against the other group is given by:

$$\frac{\text{Your Competition Fund}}{(\text{Your Competition Fund} + \text{Other Group's Competition Fund})}$$

You will find out who won and how the prize is shared later.

Group Competition: Example

EXAMPLE: Suppose that your group's competition fund is 120 points, and the other group's competition fund is 40 points. The probability that you wins the prize is $120/(120+40) = 0.75$; and the probability that B wins the prize is $40/(120+40) = 0.25$. Note that if both funds are the same size, then your chance of winning is .50.

The computer will draw a random number to determine who wins the competition.

Individual Decision

The second decision concerns what remains of an individual's endowment after the group competition decision. Each individual decides how much of this residual to invest in a private account and how much to invest in a joint account with other group members.

Every point that you invest in the private account returns one point to you. Every point that you invest in the joint account is doubled by the experimenter and then divided by the Group Decider among all three members of your group.

The Group Decider will determine his/her share, then the rest will be divided equally between the remaining two group members.

Individual Decision, Example

EXAMPLE: Suppose the competition decision is a contribution of 40 points to the group competition fund. This leaves 60 endowment points for each individual in the group. Suppose that you allocate 20 to the joint account (and 40 into your private account) and the other two group members both allocate 30 to the group account (leaving 30 in their private accounts).

The joint account therefore has an allocation of $20+30+30 = 80$. This doubles in value (to 160).

The distribution of the earnings are determined by the Group Decider. Your earnings will then be 40 from your private account, plus your share of the joint account as determined by the Group Decider.

Payoffs and information

At the end of each round, you will be told:

The size of your group's competition fund

The size of the competition fund for the group that you have been paired with

The winner of the competition

How the prize is shared (if your group wins)

Your group members' decisions about how much to put in the group's joint account

Your total pay-off then has three parts:

Your earnings from the private account

Your share of the joint account.

Your share of the prize (if your group wins)

Your Actual Payoff

At the end of the 20 rounds, one round will be chosen at random. Your pay-offs in this round will be converted into dollars at the rate of 12 points = \$1. The dollar earnings from this round, plus your show up fee, adds up to your pay-off from the experiment.

Before starting to make decisions, we ask you to fill in a questionnaire. The only purpose of the questionnaire is to check whether you have understood these instructions. When you have completed the questionnaire, please wait for the experimenter to come to check your answers.

Quiz questions

This question is about the Competition Fund. Suppose you are selected to be the Group Decider for your group. If you want there to be 120 in the Competition Fund, how much will each person (including you) place in the Fund?

_____.

How much will you have left for the individual decision? _____

This question is about the Individual Decision. Now suppose your Group Decider decides that everyone will put 30 in the Competition Fund, leaving you with 70. Also suppose you put 20 into the group account, and the other group members put 15 and 25. What will be the total earnings in the group account? _____ (Recall that your share of the joint account will be decided by the Group Decider.)

What will be your earnings from your private account? _____.

Group Competition Decision (Dictators see this one)

Recall that one person in your group is selected to be the Group Decider. That person determines the amount that all members of your group will put in the Competition Fund, and later will decide how the prize is divided (if your group wins).

YOU have been selected as the Group Decider. You will retain this role for the rest of the experiment.

Group Decider Decision (Dictators see this one)

Please indicate below how much you want each person to place into the Competition Fund this round. (Remember that the total placed in the Fund is three times this amount.)

There is no right or wrong decision; you should make the decision that you think is best.
My decision is _____.

(Submit)

Group Competition Decision (Non-dictators see this one)

Recall that one person in your group is selected to be the Group Decider. That person determines the amount that all members of your group will put in the Competition Fund.

One of the other group members has been selected as the Group Decider. The Group Decider remains the same for the rest of the experiment.

Please wait while the Group Decider makes a decision

Group Competition Decision

The Group Decider determined that each group member will place XX into the Competition Fund. This amount is now deducted and put into the Competition Fund. You will find out later whether your group wins.

Individual Decision

Now you must decide how to divide your remaining funds, _____.

Each point invested in the private account returns one point to you.

Each point invested in the joint account is doubled by the experimenter and then the Group Decider determines how this is divided.

Please indicate your allocation below (must add to your total remaining funds):

Private Account _____

Group Account _____

Competition Outcome

Your group put XX into the Competition Fund, and the other group put YY into the Competition Fund. The probability that your group wins is xx and that the other group wins is yy.

The computer has drawn a random number and determined that your group WINS/LOSES.

Sharing the Prize (Dictators see this one, in winning group)

As Group Decider, you now must decide how to divide the prize of 600 among yourself and the other two group members. You must first choose your share, then the other group members will evenly divide the rest.

Amount allocated to yourself _____

Amount allocated to each other group member _____

Sharing the Prize (Non-dictators see this one, in winning group)

Please wait while the Group Decider determines how the prize will be shared.

The Group Decider has determined that your share of the prize is _____

Sharing the Prize (Non-winning group)

Please wait.

Joint account outcome (Dictators see this one)

You put ZZ into your private account.

The total contributed to the joint account is AA. The total earnings from the joint account are $AA \cdot 2 = ??$

As Group Decider, you now must decide how to divide the earnings from the joint account among yourself and the other two group members. You must first choose your share, then the other group members will evenly divide the rest.

Amount allocated to yourself _____

Amount allocated to each other group member _____

Joint account outcome (Non-dictators see this one)

You put *ZZ* into your private account.

The total contributed to the joint account is *AA*. Total earnings from the joint account are $AA * 2 = ??$

Please wait while the Group Decider determines how the earnings from the joint account will be divided.

Sharing the Joint Account (Non-dictators see this one)

The Group Decider has determined that your share of the joint account earnings is _____
Round Earnings

Your earnings for this round are as follows:

CC from your private account

EE from your share of the competition

DD from the joint account

Your total earnings this round _____