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Identity and Redistribution: Theory and Evidence.

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Abstract

We contribute to a growing literature on redistribution and identity. We propose a theoretical model that embeds social identity concerns, as in Akerlof and Kranton (2000), with inequity averse preferences, as in Fehr and Schmidt (1999). We conduct an artefactual ultimatum game experiment with registered members of British political parties for whom both identity and redistribution are salient. The empirical results are as follows. (1) Proposers and responders demonstrate ingroup-favoritism. (2) Proposers exhibit quantitatively stronger social identity effects relative to responders. (3) As redistributive taxes increase, offers by proposers and the minimum acceptable offers of responders (both as a proportion of income) decline by almost the same amount, suggesting a shared understanding that is characteristic of social norms. (4) Subjects experience more disadvantageous inequity from outgroup members relative to ingroup members.

Keywords: Social identity; Prosocial behavior; Ultimatum game; Fiscal redistribution; Entitlements.

JEL Classification: D01 (Microeconomic Behavior: Underlying Principles); D03 (Behavioral Microeconomics: Underlying Principles).

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1 Introduction

How do humans distribute a cake of a given size among themselves? This important question in economics is central to at least two main areas. There is a large literature on redistribution and its determinants in public economics (Atkinson and Bourguignon, 2000, 2015). In a range of experimental games, such as the dictator game, the ultimatum game, and the public goods game, among many others, the central question is reallocation/redistribution of resources (Camerer, 2003; Dhami, 2016). There has been a spurt of interest in both these literatures to use the lens of *social identity theory* to examine redistribution (Shayo, 2009; Klor and Shayo, 2010; Lindqvist and Östling, 2013; Costa-Font and Cowell, 2015; Holm, 2016; Holm and Geys, 2018; Besley and Persson, 2019).

Social identity theory, a highly active area of research, within the social sciences, shows that people identify with social categories (Dhami, 2019). *Social identity* refers to ones social category, e.g., Protestant or Catholic, Democrat or Republican, African-American or Asian-American, black or white. Members of the same social category typically have shared norms of behavior that they expect others in their social category to follow (Fehr and Schurtenberger, 2018). Such norms may be enforced by punishments or sanctions, or by the self-esteem that individuals derive from conforming to them, or perhaps because they are hard-wired by evolution to do so (Tajfel, 1970; Tajfel and Turner, 1979, 1986; Turner and Reynold, 2010; Gintis, 2009). Different social contexts may trigger different identities; for instance, a family identity, a regional identity or a national identity (Turner et al., 1987).

Social identity theory has the following three features (Dhami, 2019, Ch. 3). (i) *Categorization*: People classify into the relevant social categories. (ii) *Identification*: People identify with the norms and characteristics of their category. Members of the same category are termed as *ingroup members* and members of other categories as *outgroup members*. Identification typically involves favouring the ingroup members over the outgroup members. (iii) *Social comparisons*: People compare their own group to other groups on some criteria.

In the classic model of redistribution, individuals vote for alternative linear redistributive tax rates to maximize their own monetary payoff (Meltzer and Richards, 1981). However, in the recent literature, as in Shayo (2009), individuals also care for social identity concerns; an extra term in the utility function captures the status of one's ingroup. Thus, individually optimal allocations in the Meltzer-Richard model might no longer be optimal. For instance, when poor individuals have concerns for a national identity, they might vote for lower redistribution (Shayo, 2009). This model has been extended to allow for multiple identities (Lindqvist and Östling, 2013); a social identity based on either local or national jurisdiction which determines the flow of public funds within regions (Holm and Geys,

2018); and models of endogenous, dynamic social identities (Besley and Persson, 2019). In the experimental literature Klor and Shayo (2010) show that individuals trade-off their monetary payoffs against the best redistributive tax rates for their social ingroups.

Our paper adds to the insights from this broad literatures, but it differs in the theoretical model, the subject pool, and the experiments, as we explain below. In several papers, artificial, albeit plausible, social identities are created. In some cases, the predictions of such a model are studied using non-incentivized survey data that does not directly use the identities of the subjects or uses proxies for identities (Shayo, 2009; Holm and Geys, 2018). Other contributions are purely theoretical (Lindqvist and Östling, 2013; Besley and Persson, 2019). When experimental subjects are used, typically student populations, their lab identity may differ from their real world identity that is relevant for redistribution (Klor and Shayo, 2010; Chen and Li, 2009).

We complement the existing literature by posing the following questions. (1) What is the relation between social identity and redistribution in experimental games when we use subjects whose *real world identity* would appear to be critical for the determination of redistribution? (2) In experimental games, in the presence of real world identities, what is the effect of variation in redistributive tax rates? (3) Since redistribution involves changes in the income distribution, what are the predictions of a model of inequity-averse preferences, say, the Fehr and Schmidt (1999) preferences, for redistribution in the presence of real world identities? The next three sections outline our plans for addressing these questions.

1.1 Real World identity relevant for social redistribution

In many classic experiments on social identity, individuals are primed for a *minimal group identity* (MG) that bears little resemblance to their real world identities. Nevertheless, even when primed for trivial identities, say, blue and red groups, group members favour ingroup members over outgroup members; this is the main prediction of social identity theory (Billig and Tajfel, 1973; Tajfel and Turner, 1979, 1986; McDermott, 2009). Thus, humans may be hard-wired by evolution to exhibit such preferences. Ingroup favoritism arising from social identities can give rise to cooperation among ingroup members but also socially harmful outcomes such as intolerance, discrimination, and prejudice towards outgroup members. Typically students tend to form the basis of the subject pool for experiments using the MG design (Chen and Li, 2009; Guala et al., 2013; Fowler and Kam, 2007; Eckel and Grossman, 2005).

Natural group identities created by association with *actual social groups* (SG) may have greater ecological validity. Applications with the SG design include: field experiments with Swiss army trainees (Goette et al., 2006); ethnic groups (Habyarimana et al. 2007); effects

of wartime violence on social cohesion (Gilligan et al. 2013); effects of internal sanctioning on cooperative behavior (Grossman et al., 2012); ethnic factors in judicial decisions (Grossman et al., 2016); exposure to religious messages and effects on egalitarianism and activism (McClendon and Riedl, 2015). Our interest in this paper is in SG rather than MG identities.

Political identity plays a central role in issues of real world redistribution. For instance, in the US, the Democrat party is typically identified as the party of higher taxes and higher redistribution while the Republican party is identified with lower taxes and redistribution (Dhami, 2003). Similar left-right distinctions in terms of greater-lower redistribution exist in most democratic countries. For instance, in the UK, Labour and Liberal Democrats are typically associated with higher taxes and greater redistribution and the Conservatives with lower taxes and redistribution. It would seem to us that the most relevant "real world" identity for studying issues of redistribution in the lab is the self-chosen political identity of the subjects.

Our subjects are registered members of the main British political parties: Labour, Liberal Democrats, Conservatives, Green, and UKIP (short for UK Independence Party). Party members pay a membership fee, receive party political literature that often highlights vexed and varied issues of societal redistribution, and pass on their views on such matters to the party. As such, political identity, and awareness of redistributive issues, for these individuals is very salient. Hence, our work would appear to have strong ecological validity for studying the interface between redistribution and social identity. Surprisingly little attention has been given to political identity.[1] This may partly be explained by the difficulty in getting access to registered political party members.[2]

1.2 The lab experiment

Fowler and Kam (2007) run dictator game experiments with students and find that (self-confessed) political identity of the students influences the degree of prosociality. However, it is well known that the dictator game lacks robustness to the introduction of strategic elements (Fehr and Schmidt, 2006; Dhami, 2016; Section 5.2.2). For this reason, we use

[1]We are not referring here to the survey-based studies on partisan attitudes, particularly based on US data (Green, 2004; Iyengar et al., 2012; Iyengar and Westwood, 2015; Mason, 2014). Survey data is self-reported and may be subject to well-known cognitive biases, while experiments, if they are run in an incentive compatible manner, are not subject to this problem.

[2]Such access, at least in Britain, is tightly controlled by party offices who are under no obligation to publish the details of individual party members, and are typically reluctant to expose their party members to lab experiments. A further compounding factor is that economics experiments require incentives. We found, however, that most political parties view the transfer of money from the experimenter to their party members via them with great suspicion, to the extent of reducing/blocking access to their members. This posed enormous problems of recruitment of subjects in the field for us.

an ultimatum game in our artefactual lab experiments.[3]

Using registered members of British political parties who play the ultimatum game we study the effects of political identity on social preferences in the presence (and the absence) of fiscal redistribution. There has been surprisingly little work in this important area.[4] Our experimental design ensures that each of the components of social identity theory is present. Subjects classify themselves into their political identities, outside the lab, by choosing to become fee paying members of political parties (*categorization*). Through their decisions (offers and acceptance/rejection) made in the Ultimatum Game, as proposers and responders, they engage in *identification* and *social comparison* with subjects from different political identities. One can check to see if proposers and responders act more favorably to ingroup members as in Mendoza et al. (2014), but in particular when group membership takes the form of political identities.

In the typical lab experiments on social preferences, the endowments are provided by the experimenter. Dictator game experiments have shown that the introduction of earned income to dictators reduces the pro-sociality of their offers (Cherry et al., 2002; Cappelen et al., 2007; Levitt and List, 2007). In Oxoby and Spraggon (2008) receivers in a dictator game earn the endowments; this increased the amounts transferred by the dictator. Thus, property rights may impact on experimentally observed social preferences. However, little is known about the importance of property rights on prosociality arising through earned income and taxation in ultimatum games. Lee and Shahriar (2017) find that as the earned income component of the proposer's income increases, the responder's rejection rate falls (but there is neither taxation, nor redistribution in this paper).

In our experimental design, we have two treatments. In the *standard ultimatum game*, Treatment 1, the endowments are provided by the experimenter. In the *modified ultimatum game*, Treatment 2, we allow proposers to earn their endowment, which is subject to an income tax. A proportion of the income tax revenues are redistributed to the responder to mimic societal redistribution. A comparison of Treatments 1 and 2 then allows us to

[3]The ultimatum game is a two player game in which a proposer makes offers of a fixed endowment to a responder, who either accepts the offer or rejects, in which case both get zero. The neoclassical predition is that the proposer offers the smallest divisible unit of currency, 1 cent, to the proposer. Since this offer is greater than zero, it is immediately accepted by the responder. This is possibly the most widely replicated experimental game (Camerer, 2003; Dhami, 2016, 2019). The main results are as follows (Dhami, 2016, Section 5.2). The mean offer is 30-40 percent of the endowment and the median offer is 40-50 percent of the endowment. There are rarely any unfair offers (say, less than 10 percent of the endowment) or over-fair offers (say, over 50 percent of the endowment). Low offers are rejected and the main reason for the rejections is that the responders feel that the offers were unfair. These results continue to hold with reasonable increases in the stake size, although at very high stakes, responders are willing to receive lower offers.

[4]For a recent survey of the link between social identity and redistribution, see Costa-Font and Cowell (2015). However, they are able to cite very few actual studies of the relationship between these two factors and they cite no artefactual experiments that explore this relationship.

study the prosociality of proposer offers and responder minimum acceptable offers in a 2x2 design that varies redistribution and political identities.

1.3 The theoretical model

The extent of pre-tax and post-tax income differences between individuals is a central feature in evaluating redistributive policies. Therefore, in the experimental literature on redistribution, it is not surprising that models of inequity aversion, such as the Fehr and Schmidt (1999) model, fit the data extremely well (Tyran and Sausgruber, 2006; Ackert et al., 2007). Further, the Fehr-Schmidt model is particularly suitable to a theoretical analysis of redistribution (Dhami and al-Nowaihi, 2010a, 2010b). We show in this paper that the Fehr-Schmidt model can also be easily extended for social identity concerns, as in Akerlof and Kranton (2000).

A central insight of the social identity model, backed by substantial empirical evidence, is that individuals are relatively more altruistic to ingroup members. In the Fehr-Schmidt model, this is readily captured by restricting the parameter of advantageous inequity (which captures altruism) to be larger for ingroup members than outgroup, members. By contrast, social identity theory does not provide guidance on the size of the disadvantageous inequity parameter (which captures envy) for ingroup versus outgroup members. However, this can be empirically tested by using the predictions of an appropriately specified model, as we do.

Constructing a rigorous theoretical model not only gives precise predictions that can be stringently tested it may also show that hypotheses based on informal arguments might not hold. For instance, it is routine in experimental papers that employ social identity in ultimatum games to argue that the responder will be more likely to accept offers made by ingroup proposers relative to outgroup proposers. We show that the theoretical model does not make this prediction without restrictions on the disadvantageous inequity parameter.

1.4 Main findings

Our first finding confirms the classical ingroup favoritism result in social identity theory but the remaining findings are new, as far as we are aware.

1. (Ingroup favoritism) Proposers make relatively higher offers to responders of the same political identity. Averaged across all identities, responders also state lower *minimum acceptable offers* (henceforth, MAO) when the proposer shares the same political affiliation.

2. (Left versus Right differences) Proposers make relatively higher offer to responders with a left identity (Labour, Liberal Democrats, Greens) relative to a right identity

(Conservatives and UKIP). Similarly responders ask for relatively lower MAO from left identity proposers as compared to right identity proposers. However, our results here could be driven by a greater number of left party subjects relatively to right party subjects, hence, must await further confirmation.

3. (Differing effects of social identity) The quantitative effect of social political identity on the behavior of proposers is stronger relative to that effect on the responders.

4. (Social Norms) In Treatment 2, where proposers earn their taxable endowments, they make significantly lower offers relative to Treatment 1, where endowments are unearned and untaxed. The MAO's of the responders also decrease significantly in Treatment 2. However, the reduction in proposer offers is almost identical to the corresponding reduction in the MAO of the responders, when both are expressed as a fraction of income. Since these decisions are independent, this suggests a shared understanding of how redistribution will be altered as taxes increase; such shared understanding is characteristic of social norms (Fehr and Schurtenberger, 2018).

5. (Predictions of theoretical model) The empirical findings are consistent with the predictions of our theoretical model. Our empirical results clearly show that the parameter of inequity aversion in Fehr-Schmidt preferences is higher for outsiders, relative to insiders, which is consistent with the findings of Chen and Li (2010) who use a student population and make much stronger assumptions than us. This is an important result that is only made possible by pitting the predictions of a rigorous theoretical model against the data.

1.5 Plan of the paper

Section 2 describes the theoretical model and its predictions which are tested in the rest of the paper. Section 3 explains our experimental design based on the ultimatum game and the subject pool comprising of registered British political party members. Section 4 gives the experimental results, sequentially, for proposers and responders. Section 5 concludes. The Appendix in Section 6 describes the experimental instructions.

2 The theoretical model

The *ultimatum game* is a sequential game played between two players, a *proposer* and a *responder* (Güth et al., 1982). The endowment of the proposer is $x > 0$. The proposer first makes an offer $s \in [0, x]$ to the responder, which is observed by the responder. If the responder accepts the offer, then the proposer gets to keep $y_P = x - s$ and the responder gets $y_R = s$. If the responder rejects the offer, the proposer gets $y_P = 0$ and the responder

gets $y_R = 0$. If the monetary amounts are infinitely divisible and both players have self-regarding preferences, then in the subgame perfect equilibrium the outcomes are $y_P^* = x$, $y_R^* = 0$.

We now introduce income taxation and social redistribution from the rich to the poor. The proposer's income is taxed at the rate $t \in [0,1]$ prior to the offer being made to the responder; so total tax revenues equal tx. A part $\delta \in [0,1]$ of the tax revenues is redistributed to the responder prior to the responder choosing any action; we mimic here the main feature of societal redistribution as a transfer from the rich (proposer has all the income) to the poor (responder has zero income). The remaining part $1-\delta$ does not directly add to current material payoffs, so we ignore it.[5] Thus, the post-tax incomes of the proposer and the responder are given by

$$y_P(s) = x(1-t) - s,\ y_R(s) = s + \delta t x. \tag{1}$$

It follows that

$$y_P(s) \gtreqless y_R(s) \Leftrightarrow (1 - t - \delta t)\frac{x}{2} \gtreqless s. \tag{2}$$

Since $t \in [0,1]$, in the special case of $t = 0$ (Treatment 1), we have $y_P(s) = x - s$, $y_R(s) = s$.

We assume that

$$1 - t - \delta t > 0. \tag{3}$$

Let

$$\overline{s}(t) = \frac{1}{2}(1 - t - \delta t)\, x. \tag{4}$$

From (3) and (4) we get

$$\overline{s}(t) > 0. \tag{5}$$

From (2) and (4) we get

$$y_R(s) \leq y_P(s) \Leftrightarrow s \leq \overline{s}(t). \tag{6}$$

Overfair offers in which $y_P < y_R$ are rarely observed in the data on ultimatum game experiments. Our experimental results are no exception to this rule. Therefore, and in the light of (6), we shall concentrate on offers, s, in the range

$$s \in [0, \overline{s}(t)]. \tag{7}$$

Thus, $\overline{s}(t)$ is the upper bound on offers in our model.

We assume that the proposer and the responder have Fehr-Schmidt preferences as in Fehr and Schmidt (1999). Let social identity be denoted by $S = I, O$, where I denotes

[5] This may be taken to be the analogue of real world expenditure items such as deadweight loss of taxation, expenses of operating the tax system, defence, and infrastructure expenditure.

insider identity and O denotes *outsider identity*. For players i, j and $i \neq j$, the *Fehr-Schmidt preferences* of player i, who could be a proposer ($i = P$) or a responder ($i = R$), are given by

$$U_i(s) = \begin{cases} y_i(s) - \beta_S [y_i(s) - y_j(s)] & if \quad y_i(s) \geq y_j(s) \\ y_i(s) - \alpha_S [y_j(s) - y_i(s)] & if \quad y_i(s) < y_j(s) \end{cases}, i = P, R, \tag{8}$$

where $\alpha_S \geq 0$ and $0 \leq \beta_S < 1$ are, respectively, the parameters of disadvantageous and advantageous inequity, which are common across the players (heterogeneity in parameters can be easily incorporated but not needed here). Most experimental evidence shows that $\beta_S \in [0, 1)$, $\beta_S < \alpha_S$ (Dhami, 2016, Section 5.2). An individual is said to have *social preferences* or *other-regarding preferences*, if at least one of β_S and α_S is non-zero. Self-regarding preferences is a special case in which $\alpha_S = \beta_S = 0$.

In social identity theory individuals are relatively more altruistic towards ingroup members. This is captured by the following assumption (Akerlof and Kranton, 2000).

$$\beta_I > \beta_O. \tag{9}$$

Remark 1: *Social identity theory does not predict the relative sizes of α_I, α_O. Relatively greater (lesser) envy towards richer ingroup members requires $\alpha_I > \alpha_O$ ($\alpha_I < \alpha_O$). We leave open the possibility that $\alpha_I \gtreqless \alpha_O$, however, our data is consistent with $\alpha_I < \alpha_O$.*

2.1 Some useful intermediate mathematical results

We present some intermediate results here that feed into the main results of the paper.

From (1), (5), (6), (8) and (7) we get

$$U_R(s) = s + \delta t x - \alpha_S [x(1-t) - 2s - \delta t x] \tag{10}$$

$$U_P(s) = x(1-t) - s - \beta_S [x(1-t) - 2s - \delta t x] \tag{11}$$

Substituting from (4) into (10), and simplifying, the responder's utility at the upper bound of offers, $\overline{s}(t)$ is

$$U_R(\overline{s}(t)) = \frac{1}{2}(1 - t + \delta t)\, x. \tag{12}$$

From (4) and (12) we get

$$U_R(\overline{s}(t)) > 0. \tag{13}$$

From (10) and (11), an extra unit of transfer, s, from the proposer to the responder gives the respective marginal utilities

$$\frac{\partial U_R(s)}{\partial s} = 1 + 2\alpha_S > 0, \tag{14}$$

$$\frac{\partial U_P(s)}{\partial s} = 2\beta_S - 1. \tag{15}$$

From (4), the upper bound on offers, $\overline{s}(t)$, depends on the tax rate, t, but not on the preference parameters, α_S, β_S :

$$\frac{\partial \overline{s}(t)}{\partial t} = -\frac{1}{2}(1+\delta)x < 0, \tag{16}$$

$$\frac{\partial \overline{s}(t)}{\partial \alpha_S} = \frac{\partial \overline{s}(t)}{\partial \beta_S} = 0. \tag{17}$$

Let s_c be the critical offer at which $U_R(s_c) = 0$. From (10)

$$s_c = \frac{\alpha_S - \alpha_S t - \alpha_S \delta t - \delta t}{1+2\alpha_S} x = \frac{\alpha_S + \alpha_S \delta + \delta}{1+2\alpha_S}\left(\overline{t} - t\right)x, \tag{18}$$

where

$$\overline{t} = \frac{\alpha_S}{\alpha_S + \alpha_S \delta + \delta}, \tag{19}$$

and,

$$\frac{\partial \overline{t}}{\partial \alpha_S} = \frac{\delta}{(\alpha_S + \alpha_S \delta + \delta)^2} > 0, \frac{\partial \overline{t}}{\partial \beta_S} = 0. \tag{20}$$

From (18),

$$U_R(s_c) = 0 \text{ and } s_c \geq 0 \Rightarrow t \leq \overline{t}. \tag{21}$$

Let

$$\lambda(t) = \begin{cases} \frac{\alpha_S - \alpha_S t - \alpha_S \delta t - \delta t}{1+2\alpha_S} & if \quad t \leq \overline{t} \\ 0 & if \quad t > \overline{t} \end{cases}. \tag{22}$$

It is easy to check that $\lambda\left(\overline{t}\right) = 0$. Hence, $\lambda(t)$ is continuous. It will turn out that $\lambda(t)$ is the ratio between the minimum acceptable offer of the responder and the initial endowment, $x > 0$, of the proposer (see Proposition 1, below). As an illustration, take $t = 0.3$, $\delta = 0.5$ and $\alpha_S = 1$. Then

$$\lambda(0.3) = 0.133\,33 > 0. \tag{23}$$

2.2 Responder's minimum acceptable offer (MAO)

We first define the responder's *minimum acceptable offer* (MAO), then we derive its properties.

Definition 1: *Let the tax rate, t, satisfy (3) and let $\overline{s}(t)$ be given by (4). Let the utility of the responder be given by (10). Let s_M be the minimum $s \in [0, \overline{s}(t)]$ satisfying $U_R(s) \geq 0$. Then s_M is the minimum acceptable offer (MAO) for the responder.*

The condition $s \in [0, \overline{s}(t)]$ in Definition 1 guarantees that $y_R(s) \leq y_P(s)$; recall (6). The condition $U_R(s) \geq 0$ in Definition 1 is imposed because the responder can always guarantee himself a payoff of 0 by rejecting the offer. The next proposition shows that the MAO takes a simple form.

Proposition 1: *Let the tax rate, t, satisfy (3). Let $\overline{s}(t)$ be given by (4). Let $\lambda(t)$ be given by (22). Then a minimum acceptable offer, $s_M(t) \in [0, \overline{s}(t)]$, exists and is given by $s_M(t) = \lambda(t)\, x$.*

Proof of Proposition 1: Let $\Sigma = \{s \in [0, \overline{s}(t)] : U_R(s) \geq 0\}$. From (13) we have $U_R(\overline{s}(t)) > 0$. Hence, $\overline{s}(t) \in \Sigma$. We have three cases: (i) $U_R(0) < 0$, (ii) $U_R(0) = 0$ and (iii) $U_R(0) > 0$. We consider each case in turn.

(i) Suppose $U_R(0) < 0$. Since $U_R(\overline{s}(t)) > 0$ and since $U_R(s)$ is continuous, there must be an $s_c \in (0, \overline{s}(t))$ such that $U_R(s_c) = 0$. From (14) $\frac{\partial U_R(s)}{\partial s} > 0$, thus, we must have $s_M(t) = s_c$. From (18) and (21), we get $s_M(t) = \frac{\alpha_S - \alpha_S t - \alpha_S \delta t - \delta t}{1+2\alpha_S} x$ and $t \leq \overline{t}$.

(ii) Suppose $U_R(0) = 0$. Then $s_M(t) = 0$. From (18) we get $t = \overline{t}$.

(iii) Suppose $U_R(0) > 0$. Then $s_M(t) = 0$. Let $U_R(s_c) = 0$. Since $\frac{\partial U_R(s)}{\partial s} > 0$ (recall (14)), we must have $s_c < 0$. Hence, from (18), $t > \overline{t}$.

Using (22), the above three cases, (i)-(iii), are equivalent to Proposition 1. ■

From Proposition 1, we can now see the interpretation of $\lambda(t)$. $\lambda(t) = \frac{s_M(t)}{x}$ is the ratio between the minimum acceptable offer, $s_M(t)$, of the responder and the initial endowment, $x > 0$, of the proposer. Notice that $s_M(t)$ in Proposition 1 is independent of β_S because the responder's income is always lower than the proposer's income.

We now consider the comparative static effects on s_M, when there are changes in (1) the tax rate t (which allows us to compare the results of Treatment 1, $t = 0$, and Treatment 2, $t > 0$) and, (2) the disadvantageous inequity parameter, α_S. The results depend on the sign of $\lambda(t)$. However, as indicated below, our experiments employ the case $\lambda(t) > 0$ for empirically reasonable values. Yet, for completeness, we also give the results for the case $\lambda(t) < 0$ (Proposition 2b, below).

Proposition 2: *Let the tax rate, t, satisfy (3). Let $\lambda(t)$ be given by (22).*
(a) If $\lambda(t) > 0$, then

$$\frac{\partial s_M(t)}{\partial t} = \frac{-\alpha_S - \alpha_S \delta - \delta}{1 + 2\alpha_S} x < 0 \text{ and } \frac{\partial s_M(t)}{\partial \alpha_S} = \frac{1 - t + \delta t}{(1 + 2\alpha_S)^2} x > 0$$

(b) If $\lambda(t) < 0$, then

$$\frac{\partial s_M(t)}{\partial t} = \frac{\partial s_M(t)}{\partial \alpha_S} = 0.$$

(c) The MAO is unaffected by β_S, i.e., $\frac{\partial s_M(t)}{\partial \beta_S} = 0$.

Proof of Proposition 2: Proposition 2 follows by differentiating $s_M(t)$ given by Proposition 1. ■

Corollary 1: *Let the tax rate, t, satisfy (3). Let $\lambda(t)$ be given by (22). If $\alpha_I > \alpha_O$ (relatively greater envy towards richer ingroup members) then the responder makes a strictly higher MAO, $s_M(t)$, from ingroup relative to outgroup responders. Conversely, if $\alpha_I < \alpha_O$, then the responder makes a strictly higher MAO, $s_M(t)$, from outgroup relative to ingroup responders.*

Proof: Follows directly from Proposition 2a. ■

Suppose $\lambda(t) > 0$, as in Proposition 2a. An increase in the tax rate reduces income inequity between a relatively poorer responder and a relatively richer proposer. Hence, the responder reduces the MAO because a smaller MAO is required to reduce income inequality. If however, the disadvantageous inequity parameter α_S of the responder increases, then for any given split of income, the responder asks for a higher MAO in order to mitigate income inequality with the proposer. As noted, the case in Proposition 2b is not empirically important.

Discussion: Let $\lambda(t) > 0$, which is the case we consider in our empirical exercise. There are two major implications of Proposition 2 and Corollary 1. First, from Proposition 2a, as we move from Treatment 1 (experimenter-provided endowments and $t = 0$) to Treatment 2 (earned income and $t > 0$), our model predicts that the MAO of the responders will strictly decline. Second, from Remark 1 social identity theory does not pin the relative sizes of α_I, α_O but Corollary 1 shows how we might test of the relative magnitudes of α_I, α_O. Our empirical findings are consistent with the case $\alpha_I < \alpha_O$, which confirms the results of Chen and Li (2010) but our result requires much weaker assumptions and we use a real world identity.

Results of ultimatum games often express the MAO of the responder as a proportion of the proposer's income (in our case, the after-tax income). For this reason, we shall find it convenient to use the new variable $\widetilde{s}_M(t) = \frac{s_M(t)}{(1-t)x}$. Using $s_M(t) = \lambda(t)\, x$ (Proposition 1) we can write $\widetilde{s}_M(t) = \frac{\lambda(t)x}{(1-t)x} = \frac{\lambda(t)}{1-t}$, which is independent of the initial level of income, x. A simple calculation shows that the comparative static effects of the exogenous variables are identical whether our object of interest is $s_M(t)$ or $\widetilde{s}_M(t)$. This is summarized next.

Corollary 2: *The comparative statics for the variable, $\widetilde{s}_M(t)$, are given by:*

(a) If $\lambda(t) > 0$, *then*

$$\frac{\partial \widetilde{s}_M(t)}{\partial t} = \frac{-(1+\alpha_S)\delta}{(1+2\alpha_S)(1-t)^2} < 0; \frac{\partial \widetilde{s}_M(t)}{\partial \alpha_S} = \frac{1-t+\delta t}{(1+2\alpha_S)^2(1-t)} > 0.$$

(b) If $\lambda(t) < 0$, *then*

$$\frac{\partial \widetilde{s}_M(t)}{\partial t} = \frac{\partial \widetilde{s}_M(t)}{\partial \alpha_S} = 0.$$

(c) $\frac{\partial \widetilde{s}_M(t)}{\partial \beta_S} = 0.$

Discussion of Corollary 2: Comparing (a)-(c) in Corollary 2 with (a)-(c) of Proposition 2, we see that they are qualitatively identical and differ quantitatively only in part (a). Thus, although responders decide on their MAO, $s_M(t)$, if we are interested only in the qualitative effects, we can equivalently consider the transformed variable $\widetilde{s}_M(t)$, which is typically used in applied research. In our Treatment 2, we give proposers an opportunity to double their endowments by successfully answering quiz questions in order to create an entitlement to earnings. Hence, we have two kinds of proposers, those with endowment $2x$ and those with endowment x, depending on whether they were successful or not in answering the quiz. This does not alter the comparative static results (a)-(c) for $\widetilde{s}_M(t)$ because $\widetilde{s}_M(t) = \frac{\lambda(t)}{1-t}$ is independent of x. In other words, these results hold for both types of proposers.

2.3 The proposer's optimal offer

Let us now consider the behavior of proposers. As in the case of a Stackelberg leader, the proposer maximizes the objective function in (11) subject to the responder's optimal strategy that is described in Proposition 1. The comparative static results depend on the size of β_S, the proposer's advantageous inequity parameter.

Proposition 3: *Let the tax rate,* t, *satisfy (3) and let* $\overline{s}(t)$ *be given by (4). Let the utility of the proposer be given by (11). Let* $s_M(t)$ *be the minimum acceptable offer (MAO) for the responder, as given by Proposition 1. Let* $s^*(t)$ *maximize* $U_P(s)$ *subject to* $s_M(t) \leq s^*(t) \leq \overline{s}(t)$, *where* $s_M(t)$ *is given by Proposition 1.*

(a) Assume $\beta_S > \frac{1}{2}$. Then

$$\begin{aligned}
\textit{(i)}\ s^*(t) &= \overline{s}(t) = \frac{1}{2}(1-t-\delta t)\,x, \\
\textit{(ii)}\ \frac{\partial s^*(t)}{\partial t} &= \frac{\partial \overline{s}(t)}{\partial t} = -\frac{1}{2}(1+\delta)\,x < 0, \\
\textit{(iii)}\ \frac{\partial s^*(t)}{\partial \alpha_S} &= 0, \\
\textit{(iv)}\ \frac{\partial s^*(t)}{\partial \beta_S} &= 0.
\end{aligned}$$

(b) Assume $\beta_S = \frac{1}{2}$. Then $s^* \in [s_M(t), \overline{s}(t)]$.
(c) Assume $\beta_S < \frac{1}{2}$. Then

$$\begin{aligned}
\textit{(i)}\ s^*(t) &= s_M(t), \\
\textit{(ii)}\ \frac{\partial s^*(t)}{\partial t} &= \frac{\partial s_M(t)}{\partial t}, \\
\textit{(iii)}\ \frac{\partial s^*(t)}{\partial \alpha_S} &= \frac{\partial s_M(t)}{\partial \alpha_S}, \\
\textit{(iv)}\ \frac{\partial s^*(t)}{\partial \beta_S} &= 0.
\end{aligned}$$

(d) Indicate the dependence of s^* on β by writing $s^*(t,\beta)$. Let $\beta_1 < \frac{1}{2}$ and $\beta_2 > \frac{1}{2}$ be two different values of β_S. Then

$$s^*(t,\beta_1) < s^*(t,\beta_2).$$

Proof of Proposition 3: Let the tax rate, t, satisfy (3) and let $\overline{s}(t)$ be given by (4). From (6), it follows that $y_R(s) \leq y_P(s)$. Hence, the utility of the proposer is given by (11). The reason for the lower bound, $s_M(t)$, is that any offer, s, strictly below this will automatically give the proposer a payoff of zero, which could be bettered by an offer at least as high as $s_M(t)$.

(a) $\beta_S > \frac{1}{2}$. From (15) we get $\frac{\partial U_P(s)}{\partial s} > 0$. Hence, $s^*(t) = \overline{s}(t)$. This establishes part (i). Parts (ii), (iii) and (iv) then follow from (16), (17).

(b) $\beta_S = \frac{1}{2}$. From (15) we get $\frac{\partial U_P(s)}{\partial s} = 0$. Hence, $s^*(t) \in [s_M(t), \overline{s}(t)]$.

(c) $\beta_S < \frac{1}{2}$. From (15) we get $\frac{\partial U_P(s)}{\partial s} < 0$. Hence, $s^*(t) = s_M(t)$. This establishes part (i). Parts (ii) and (iii) then follow immediately. Part (iv) follows from Proposition 2c.

(d) From part (ai) we get $s^*(t,\beta_2) = \overline{s}(t)$. From part (ci) we get $s^*(t,\beta_1) = s_M(t)$. Hence, $s^*(t,\beta_1) < s^*(t,\beta_2) \Leftrightarrow s_M(t) < \overline{s}(t)$. From (4) and Proposition 1 we get $s_M(t) < \overline{s}(t) \Leftrightarrow \frac{\alpha_S - \alpha_S t - \alpha_S \delta t - \delta t}{1+2\alpha_S} x < \frac{1}{2}(1-t-\delta t)\,x$. Simplifying gives $s_M(t) < \overline{s}(t) \Leftrightarrow 1 - t + \delta t > 0$. However, using (3), we have $1 - t + \delta t \geq 1 - t - \delta t > 0$. Hence, $s^*(t,\beta_1) < s^*(t,\beta_2)$. ■

Discussion of Proposition 3: (a) Proposition 3aii shows that, for $\beta_S > \frac{1}{2}$, $\frac{\partial s^*(t)}{\partial t} < 0$. It follows that as we move from Treatment 1 (experimenter-provided endowments and $t = 0$) to Treatment 2 (earned income and $t > 0$), the optimal share offered by the proposer to the responder, $s^*(t)$, is predicted to strictly decline. Propositions 2a and 3cii show that the same result holds for $\beta_S < \frac{1}{2}$ and $\lambda > 0$. Proposition 3d shows that an increase in β_S from below $\frac{1}{2}$ to above $\frac{1}{2}$, leads to a discontinuous increase in the optimal offer, $s^*(t, \beta_S)$. An important application of this is when $\beta_O < \frac{1}{2}$ but $\beta_I > \frac{1}{2}$, which satisfies (9). This can explain our empirical result (see below) that a proposer will offer less to an outgroup member relative to an ingroup member.

Empirical analyses of ultimatum games often express the offer of the proposer as a proportion of the proposer's income (in our case, the after-tax income) Analogous to Corollary 2, we can introduce the new variable $\widetilde{s}^*(t) = \frac{s^*(t)}{(1-t)x}$. We note the equivalence of the qualitative properties of $\widetilde{s}^*(t)$ and $s^*(t)$ in the next Remark.

Remark 2: *(a) Let $\beta_S > \frac{1}{2}$. From Proposition 3ai, $s^*(t) = \overline{s}(t)$ and, hence, $\widetilde{s}^*(t) = \frac{\overline{s}(t)}{(1-t)x} = \frac{1-t-\delta t}{2(1-t)}$. It follows that*

$$\frac{\partial \widetilde{s}^*(t)}{\partial t} = \frac{-\delta}{2(1-t)^2} < 0,$$

which is qualitatively the same as Proposition 3aii, though numerically different. The comparative statics with respect to α_S and β_S are exactly the same as for Proposition 3a. (b) Let $\beta_S < \frac{1}{2}$. From Proposition 3ci, $s^*(t) = s_M(t)$ and, hence, $\widetilde{s}^*(t) = \frac{s_M(t)}{(1-t)x} = \widetilde{s}_M(t)$. It follows that the comparative statics here are exactly the same as in Corollary 2.

From Remark 2, if one is interested in the qualitative results, one may consider either $s^*(t)$ or the transformed variable $\widetilde{s}^*(t)$ that is typically used in empirical research.

3 Subject pool and experiment design

3.1 Subject pool

Our subjects are registered members of British political parties, who play the Ultimatum Game in the role of proposer or responder (but not both). As noted in the introduction, these subjects are likely to possess a strong *political identity* and engage in politically motivated activities, such as voting in elections and participating in debates on the degree of redistribution to be carried out in society. To the best of our knowledge, this is the first time that this subject pool has been studied in experiments of this kind.

We contacted five of the most widely supported national political parties in England for access to their registered members.[6] The five parties were the Green Party, Labour Party,

[6]Only the local offices of parties in England were contacted. This was due to the salience of national

Liberal Democrats, the Conservative Party, and the UK Independence Party (UKIP). This constitutes a richer spectrum of political parties relative to the few studies using US data (see the introduction); a limiting feature of these studies is that they are based on dictator games and unearned endowments. We were unable to garner sufficient observations from the UKIP supporters, possibly due to their relatively smaller number, hence, in this paper we focus mainly on the other four parties.

British political party membership is generally set up so that only the local party office has access to the contact information for members in their area. Emails were sent from a University of Leicester email account to the local party office. The initial email included a detailed outline of the research and what the experiment would entail; an email reminder was sent in most cases. The emails also briefly explained some of the salient features of experiments within economics such as the roles of incentives and anonymity. Given the UK Data Protection Laws, we requested the parties to contact their members themselves, through an email containing the link to our experiment. Since the survey distribution takes place through emails sent out by the political party offices themselves, this may have a priming effect on political identity, increasing the salience of already existing political identities. Further priming takes place when we ask subjects to state the strength of their political affiliation with their chosen political party. This is likely to increase the ecological validity of our results for the predictions of social identity theory.

Respondents from political parties completed an online questionnaire using the survey platform Qualtrics, which ensured complete anonymity.[7] Participation in the experiments was voluntary.[8] Due to the nature of online experiments, it was not possible to completely control either the environment in which the experiment was conducted or the demographics of those who self-selected themselves into the experiment.[9] However, this is unavoidable given UK data protection laws and the fact that the participation decision is voluntary. The main advantage of using registered political party members is that it allows for a more demographically diverse, and politically primed, subject pool relative to a standard lab experiment with student subjects.

Whilst our experimental design does not randomly sample from the entire population of

identities in Wales, Scotland and Northern Ireland that results in large support bases for the Nationalist parties in each country. Our sampling area was across England, focussing primarily on large cities.

[7]Neither the experimenter nor other participants were able to identify our subjects, and this was known to the subjects. Given the often sensitive nature of political affiliation and the possible discriminatory nature of social identity decisions, this was of vital concern for the accuracy of our data.

[8]All respondents were required to give their consent for participation, without which they could not proceed any further. Those who were unwilling to give consent were thanked for their time and offered inclusion into a lottery to win £10 (this occurred only once in the experiment and the subject that declined consent did not select into the lottery).

[9]For instance, online experiments can only be taken by those with internet accesses and, thus, may not be applicable to all sections of society although there is near-universal access to the internet in England.

political party members in England, the demographics of our subject pool broadly reflect that of the party membership on aggregate. Data on political party make-up is hard to obtain because different parties classify membership differently and are under no legal obligations to report their membership numbers, let alone the demographic make-up of the members. However, using a House of Commons Briefing Paper–Membership of Political Parties (2017), and YouGov information[10], we are able to make broad comparisons. Other than education (our subjects are slightly more educated) our sample is representative of the general membership of political parties.

Data collection took considerable time as we did not have direct access to the subjects. The only method of recruiting subjects was to continue to write to party offices who in turn made the decision to forward our request (or not) to their party members. The response from the different political parties was uneven; there were only 3 subject responses from the UKIP, which we had to eliminate from our sample. Among the rest, the number of subjects from the Conservative party are the lowest.

Our use of the strategy method to elicit the responses of both proposers and responders in an ultimatum game significantly expands the data we gather. As part of the strategy method, responders (respectively, proposers) are asked to state their minimum acceptable offer (respectively, offer) when the other player is of any of the 5 different political identities and of an unknown political identity (anonymous identity). Due to the smaller number of right wing parties (UKIP and Conservatives), our data is subject to the caveat that it over-represents left-wing parties (Labour, Liberal Democrats, and Green). This is an unavoidable cost to pay when one moves from the sanitized lab environment to a field subject pool such as ours.

Additional and unavoidable problems arose during the lengthy data collection process.[11] As most of these events are related to the Brexit Referendum, we use a Mann-Whitney U test to determine whether our responses change significantly after this event. No temporal change in responses was found, so we chose to pool the data. Our results are robust to the inclusion of time fixed effects. In conjunction, these results show that social identity and prosociality were not affected by the other political events that occurred during the data collection process.

Table 1 outlines the total number of proposers and responders we have in our data for each political party.

[10]https://yougov.co.uk/news/2017/04/25/demographics-dividing-britain/

[11]In a fast moving series of events, the Brexit referendum occurred, David Cameron resigned as Prime Minister, Nick Clegg resigned as leader of the Liberal Democrats, Ed Miliband resigned as leader of the Labour Party in conjunction with other political occurrences.

3.2 The experimental design

The details of the experimental design can be found in the Appendix. Here we briefly outline the main features. All participants were assured that the data collected in the experiment was anonymized. Subjects began by answering some demographic questions (age, gender, education). They then stated their political identity (one of Labour, Conservative, Liberal Democrat, Green, or UKIP), and the strength of their political affiliation on a 5 point Likert Scale from very strong (1) to very weak (5).

The Ultimatum Game was explained to the subjects and they must correctly answer two questions designed to test their understanding, in order to proceed further in the experiment. Subjects who correctly answered the test questions were assigned either the role of the proposer or the responder for the rest of the experiment (but not both roles).

Subjects sequentially played the following two treatments.

Treatment 1: Subjects play a *standard ultimatum game* augmented to include the role of political identity. The proposer is given an endowment of £10. The proposer first played an ultimatum game against a responder whose political identity they did not know (first sub-treament); we term such responders as having an anonymous (political) identity. In a separate, and second sub-treatment, the strategy method is then used to elicit the offers that proposers would make to a responder with the following 5 possible political identities: Labour, Conservative, Liberal Democrat, Green, and UKIP.

In the first sub-treatment for responders, we elicit the *minimum acceptable offer* (MAO) that subjects in their roles as responders demand from proposers whose political identity they did not know. We term such proposers as having an anonymous (political) identity. In the second sub-treatment, we then use the strategy method to elicit the responder's MAO against the following possible political identities of the proposer: Labour, Conservative, Liberal Democrat, Green, and UKIP.

The strategy method allows us to elicit the complete strategy of each player and leads to a substantial increase in the data points (Bardsley et al., 2010). All decisions by proposers and responders were made using a slider task (see screenshots in the Appendix). In order to eliminate potential order effects, we undertook two precautions. (1) The order of the two sub-treatments for the proposer and for the responder was randomized. (2) When the strategy method was used to elicit the choices of the proposer and the responder, the order of the party-affiliations (Labour, Conservative, Liberal Democrat, Green, and UKIP) of the other player was also randomized.

Treatment 2: Subjects play an *augmented ultimatum game*, which takes account of real world fiscal redistribution. The difference from Treatment 1 is that (1) proposers earn their endowments, which are subject to an income tax, and (2) a part of the tax revenues is redistributed to the responder. Proposers were initially given an endowment of £10 and

Table 1: Subjects by Political Identity

Party \Role	Proposers	Responders
Conservative	19 Participants 114 Data Points	15 Participants 90 Data Points
Green	32 Participants 192 Data Points	28 Participants 168 Data Points
Labour	52 Participants 312 Data Points	51 Participants 306 Data Points
Lib Dem	34 Participants 204 Data Points	37 Participants 222 Data Points
Total	137 Participants 822 Data Points	131 Participants 786 Data Points

Breakup of the data points by political identity.

then given the chance to earn an extra £10 by correctly answering at least 4 out of 5 simple arithmetic questions (95% of our proposers got at least 4 correct answers). The purpose of this exercise was to create an *entitlement effect* on earned income. The difficulty of the questions has been shown to be inconsequential. Hoffman and Spitzer (1993) show that merely announcing entitlements is sufficient to induce property rights over the endowment.

Furthermore, we implement a fiscal redistribution system within the game. Proposers, the only players with income in the model, are subject to an income tax at a rate of 30% on their endowment. Half the tax revenues are redistributed to the responder, the player with no income, to mimic social redistribution. In terms of the model in Section 2, $t = 0.3$ and $\delta = 0.5$. The remaining 50% of the tax revenues are taken out of the experiment; this portion can be thought of as non-redistributive government expenditures. The fiscal redistribution is mutual knowledge to the proposer and the responder, enabling them to take it into account in making their decisions.

In both treatments, subjects are informed at the start of the experiment that they will be matched randomly with a second player (a responder or a proposer, depending on their role) and one of the actual decisions will be selected at random and used to determine their payoffs to ensure incentive compatibility of decisions.

We did not randomize between the two treatments (although we randomize between sub-treatments and political identities as explained earlier) because of two reasons. (i) The simple ultimatum game in both Treatments is new to our subjects. Furthermore, Treatment 2 is significantly more complicated than Treatment 1 because it involves taxation and redistribution of income. As such, and using the analogy that it is easier to walk first before one can run, we are likely to get more accurate responses if subjects first learn to play the simpler Treatment 1. The importance of this factor for new games cannot be overstated. (ii) If we had played Treatment 2 first, then subjects might have been subject to a *house money effect* in moving to Treatment 1; this effect is positive for responders and either negative or positive for proposers because not only are they taxed, they can

double their endowments as well in Treatment 2. This could have affected the reliability of our results.

Each subject (with a fixed role as proposer or responder) played both treatments using the strategy method. Hence, the number of data points for each player is $2 \times 6 = 12$ (2 is the number of treatments and 6 is the number of identities of the other player including 5 political parties and one anonymous identity). The survey was completed within 20 minutes for all respondents and the average payments were £4.59; this is in excess of 160% of the minimum wage in the UK. The number of data points corresponding to each political identity are described in Table 1; we have a total of 822 offers made by 137 proposers and 786 minimum acceptable offers by 131 responders for a total of 1608 data points. We had only 3 responses from UKIP party voters for reasons noted in the introduction, which might not be representative of the party membership. For this reason we have dropped these three subjects from the analysis.[12]

3.2.1 Two comments on our experimental design

We are primarily interested in the effects of political identity on prosociality of choices in the presence of earnings and redistribution of earnings. With this in mind, it is worth addressing two further points about our design.

1. Our first point is methodological. In Treatment 2, the operation of the fiscal system necessarily involves taxation and redistribution, simultaneously. We are not interested in the separate effects of taxation and redistribution on individual choices, relative to Treatment 1, but rather in the "joint effect" of these two factors. Thus, it made no sense to vary taxation and redistribution separately. Furthermore, as a practical matter, one can have no redistribution in the absence of taxation and unless the use of tax revenues (redistribution in our case) is explicitly specified, it is pointless to tax individuals.

2. Recall that in our first sub-treatments for proposers and responders, their actions towards a subject with an anonymous identity were separately elicited. Since we are interested in the effects of ingroups and outgroups we omit this data in our formal regression analysis, which takes account of decisions conditional on political identity. So this data does not play a substantive role in our analysis and results. However, in our descriptive statistics, we do offer a comparison of the difference in actions of the subjects towards an anonymous identity relative to a specific political identity because this question might be of some independent interest. By construction, given that all our subjects were actual registered members of British political parties, none had an anonymous political identity. To maintain the purity of our sample, we did not wish to introduce subjects from outside

[12]However, in the strategy method all non-UKIP proposers (respectively responders) were asked to make offers (minimum acceptable offers) against a UKIP responder (respectively, proposer). This data has been retained.

the sample who professed to have an anonymous, but non-verifiable, political identity.

We ran the two sub-treatments (with anonymous identity of the partner in the first and political identity of the partner in the second), separately and the order was randomized. Thus, it is unlikely that there were any spillover effects between the two. We now address the issue of subject deception in this particular design. There are currently no widely accepted definitions of subject deception. We believe that our design did not mislead subjects. The subjects were told that all other subjects were members of one of the five political parties. It was explained to the subjects that "anonymous" meant "you do not know which political party the other subject belongs to".

4 Experiment Results

In this section, we present our results and demonstrate significant effects of political identity in determining proposer offers and the MAO's of responders.

Note: Unless otherwise specified, all proposer offers and responder MAO's are expressed as a percentage of the after tax endowments of the proposer. The normalization by post-tax endowment does not change the qualitative predictions of our theoretical model; see Corollary 2, Remark 2, and the discussions. The post-tax endowment of a proposer who has an endowment of 20 is $20(1 - 0.3) = 14$.

4.1 The behavior of proposers

In this section, we analyze the offers of proposers and it's correlates.

4.1.1 Descriptive statistics on average behavior of proposers

In this section we give the descriptive statistics of the behavior of proposers, averaged across all political identities. Thus, these statistics are on decisions that are not conditioned on political identity. In the next section, we consider a regression analysis in which we condition behavior on the political identity of proposers.

Table 2 gives the summary data for the offers (as a percentage of proposer's after-tax income) made by proposers to each type of responder; Lib Dem stands for Liberal Democrats, Con for Conservatives, and Anon for Anonymous. The average and the median offers by proposers fall within the usual range observed in other ultimatum game experiments. Proposers offering over 90% of the endowment are clear outliers (less than 1.1% of total offers). All offers over 90% were to one's own ingroup members. Average offers are relatively lower in Treatment 2 when incomes are taxed and redistributed.

Table 3 reports 'pairwise differences' of *average proposer offers* (i.e., averaged across all proposer identities) to responders with distinct political identities. These pairwise dif-

Table 2: Descriptive Statistics: Proposer Offers

PROPOSER OFFERS	Anon	Green	Labour	Lib Dem	Con	UKIP
TREATMENT 1						
Mean	0.47	0.43	0.43	0.42	0.37	0.30
Median	0.50	0.50	0.50	0.50	0.49	0.30
Maximum	0.92	1	1	1	0.91	0.94
TREATMENT 2						
Mean	0.39	0.37	0.37	0.38	0.31	0.26
Median	0.39	0.39	0.39	0.39	0.35	0.29
Maximum	0.86	0.93	0.86	1	0.79	0.79

Summary statistics of proposer offers to responders of different identities, as a percentage of the proposer's after-tax income

Table 3: Wilcoxon signed-rank tests: Proposer Offers

	Green	Labour	Lib Dem	Con	UKIP
Proposers					
Anon	-0.04***	-0.03**	-0.05***	-0.09***	-0.17***
Green	-	0	-0.01	-0.05***	-0.13***
Labour	-	-	-0.02	-0.06***	-0.13***
Lib Dem	-	-	-	-0.04***	-0.12***
Con	-	-	-	-	-0.08***
Proposers-Taxation					
Anon	-0.02	-0.03	-0.02	-0.08***	-0.14***
Green	-	0.07	0	-0.06***	-0.11***
Labour	-	-	0	-0.06***	-0.11***
Lib Dem	-	-	-	-0.07***	-0.12***
Con	-	-	-	-	-0.05***

Wilcoxon Signed Rank Tests to test pairwise differences of average proposer offers, as a percentage of proposer's after-tax income, to responders of two different political identities - the column responder identity minus the row responder identity. Null Hypothesis: No difference in the offers made by proposers to a responder with a column identity and a responder with a row identity. All tests are two sided. Stars denote significance levels; * ($p < 0.1$); ** ($p < 0.05$); *** ($p < 0.01$).

ferences are tested using a Wilcoxon signed rank test. Each number in Table 3 shows the average offers made to a responder with the column identity minus the average offer made to a responder with the row identity, expressed as a percentage of the proposer's after-tax income. For instance, the third entry in the column for Lib Dem, which is -0.02,

is the average proposer offer to a Lib Dem responder minus the average offer to a Labour responder, as a percentage of the proposer's after-tax income. Positive (respectively, negative) values, therefore, indicate a relatively higher offer to the responder with the column (respectively, row) identity.

Consider the average difference in offers from proposers to a responder with any of the 5 political identities relative to an anonymous responder. We are able to reject the null hypothesis that these differences are equal for (1) all possible cases in Treatment 1 (see the top row of numbers in Table 3), and (2) in Treatment 2 when the column identity of the responder is a Conservative or UKIP member (see the last two numbers in the first row following Treatment 2 in Table 3). These differences are negative (and significant in 7 out of 10 cases) which shows that proposers offer less to a responder of any political identity relative to a responder with no political identity (Anon).

Result 1: On average, and not controlling for the political identity of proposers, relatively higher amounts are offered to a responder with an anonymous political identity relative to a responder with a political identity.

In Result 1, we only consider average offers across all proposers and do not control for the political identity of the proposer. When we consider the data on proposers disaggregated by political parties, Liberal Democrat proposers offer more to their ingroup responders, relative to Anon responders, and the difference is statistically significant at the 5% level. The difference between the offers made to ingroup responders and Anon responders is also positive for proposers belonging to the Green party, although the difference is significant only in Treatment 2. This difference in offers is not statistically significant for proposers belonging to any other political party. One possible explanation is that for our subjects whose political identity is highly salient, other political parties may be viewed as competitors, as in the case of competition for votes in elections. Hence, a lower amount is offered to members of other political parties relative to an anonymous identity.

For both treatments, let us omit the row for the Anon identity in Table 3 for the moment. Of the remaining data shown in Table 3, the numbers in the last two columns are statistically significant and negative, while none of the other numbers are significant. Thus, responders with either Conservative or UKIP identities are made a lower offer relative to responders of other political identities. Conservative responders are made offers by proposers that are on average 6.5% less than responders from all other parties. Offers to Conservative responders are only higher relative to UKIP responders (8% higher in Treatment 1 and 5% higher in Treatment 2). If one classifies the Conservative and UKIP identities as right wing, and the others as left wing, then we have the following result.

Result 2: On average, and not controlling for the political identity of proposers, lower

amounts are offered to right wing responders relative to left wing responders.

One possible explanation for Result 2 is as follows. If proposers make relatively higher offers to ingroup responders (see Result 3 below), then the smaller number of Conservative and UKIP proposers in our sample may have biased our results to reduce mean offers to responders from these two parties. Another possibility is that support for the Conservative party is perceived to be higher among higher income earners in the UK, and UKIP may be viewed as too right wing. These factors may have elicited lower offers to responders of these identities. Examining these questions requires additional data.

Remark 3: *While Results 1 and 2 do not directly follow from the parsimonious model in Section 2, they can nevertheless be accommodated within our model. From Proposition 3a, if* $\beta_S > \frac{1}{2}$*, then* α_S, β_S *have no effect on the optimal offers of proposers. So suppose that* $\beta_S < \frac{1}{2}$*, which is consistent with the weight of the evidence when there is no ingroup-outgroup distinction, see Dhami (2016, Table 6.1). Then, we know from Proposition 3c and Proposition 2a (the case* $\lambda(t) < 0$ *is empirically irrelevant) that* $\frac{\partial s^*(t)}{\partial \alpha_S} > 0$*. Thus, Result 1 is consistent with a higher value of* α_S *for responders of anonymous political identity, and Result 2 is consistent with a lower value of* α_S *for right wing responders. A similar extension of our model can account for Result 5 for responders, below.*

4.1.2 Regression analysis

To allow for a closer examination of the effects of political identity in the Ultimatum Game, we run 6 OLS regressions that are reported in Table 4. We omit the anonymous identity here because we are interested in the ingroup-outgroup effects of political identity (Proposition 3d), and the effects of fiscal redistribution (Proposition 2a, Proposition 3aii, Proposition 3cii) on optimal offers by proposers. As noted earlier, we also omit the 3 subjects with the UKIP identity. We estimate a regression of the following form

$$y = a_0 + a_1 d_1 + \sum\nolimits_{i=2}^{i=4} a_i d_i + a_5 d_5 + a_6 d_6 + a_7 d_1 d_6 + \mathbf{bX} + \varepsilon, \tag{24}$$

where ε is a error term (we cluster the standard errors at the subject level), and y is the proposer's offer expressed as a percentage of the after-tax endowment. Each proposer makes 10 allocation decisions; omitting offers to Anon responders, each proposer makes one offer to each of 5 political identities of the responder in 2 different treatments, Treatment 1 and Treatment 2. We have 137 proposers in the sample, giving 1370 observations on offers in total. The explanation of the regressors in (24) is as follows.

1. The dummy variable d_1, 'Own', takes the value of 1 if the responder is of the same political identity as the proposer, and 0 otherwise. This allows us to explore the

classic ingroup-outgroup effects in social identity theory. Recall that Results 1 and 2 are for the average offers made to responders when we do not take account of the political identity of proposers. However, the regression analysis allows us to pinpoint the political identity of the proposer and identify if higher offers are made to ingroup or outgroup responders. This is the sense in which the subsequent results for proposers differ from Results 1 and 2.

2. We have four categories of political identity (Labour, Liberal Democrats, Conservatives, and Green) after omitting UKIP. Using the category Conservatives as our benchmark, we use 3 dummy variables to control for the political identity of the proposer: d_2 equals 1 if Green Party and zero otherwise; d_3 equals 1 if Labour and zero otherwise; d_4 equals 1 if Liberal Democrats and zero otherwise. These variables allow us to examine the size of the offers made by proposers of alternative political parties, relative to the benchmark of a Conservative proposer.

3. The variable d_5, 'Strength', gives the self-reported feelings of belonging to a political party, where 1 is the highest possible strength and 5 the lowest. This variable allows us to examine whether the proposer's offers are influenced by how strongly they identify with their political identity.

4. The dummy variable d_6, 'Entitlement', captures treatment effects. It takes a value 1 for Treatment 2 and value 0 for Treatment 1. This variable is designed to pick out the effects of entitlements to income and fiscal redistribution on one's degree of prosociality.

5. The variable $d_1 d_6$ is an interaction term between Own and Entitlement.

6. The vector $\mathbf{X}$ includes information on demographic variables such as age, gender, and education; and $\mathbf{b}$ is the associated vector of regression coefficients.

7. We also included time fixed effects in our regression analysis but these did not turn out to be significant. Further to ensure the robustness of our results we ran additional regressions controlling for the political identity of the responder. Consistent with the results shown in Table 3 lower offers are made to subjects belonging to the Conservative Party and UKIP. We omit these results.[13]

Table 4 shows the regression results. We have dropped the interaction terms (Own with Entitlements and Own with Strength) and dummies for the political identity of the

[13]These results along with results of other interaction terms that we tried out (e.g., the interaction of Own and Strength variables) but that did not turn out to be significant are available from the authors on request.

Table 4: OLS Regressions: Proposer Offers

	(1)	(2)	(3)	(4)	(5)	(6)
Own	0.117***	0.117***	0.117***	0.117***	0.117***	0.114***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Green		0.129***	0.138***	0.138***	0.140***	0.141**
		(0.042)	(0.042)	(0.042)	(0.044)	(0.062)
Labour		0.094**	0.100***	0.100***	0.107***	0.121**
		(0.036)	(0.036)	(0.036)	(0.038)	(0.057)
Lib Dem		0.089**	0.094**	0.094**	0.095**	0.087
		(0.038)	(0.037)	(0.037)	(0.039)	(0.062)
Strength			-0.017	-0.017	-0.017	-0.017
			(0.014)	(0.014)	(0.013)	(0.016)
Entitlement				-0.053***	-0.053***	-0.054***
				(0.009)	(0.009)	(0.010)
Constant	0.339***	0.251***	0.277***	0.304***	0.323***	0.416***
	(0.013)	(0.034)	(0.042)	(0.043)	(0.060)	(0.088)
Demographics	No	No	No	No	Yes	Yes
Date	No	No	No	No	No	Yes
R^2	0.06	0.09	0.09	0.11	0.13	0.29
AIC	-682.33	-725.71	-725.22	-725.22	-767.10	-1002.26
BIC	-671.89	-694.37	-688.67	-710.43	-709.65	-819.73
N	1,370	1,370	1,370	1,370	1,370	1,370
Subjects	137	137	137	137	137	137

Dependent variable in each of the six reported regressions is the offer made by the proposer as a fraction of his after-tax income. Standard errors in parenthesis clustered at the subject level. Demographic controls include age, gender and level of education. Significance levels: *** ($p < 0.01$); ** ($p < 0.05$); * ($p < 0.1$).

responder in the Table, because these were all highly insignificant.[14] From the first row in Table 4 (see variable labelled 'Own'), proposers make significantly higher offers to responders who are of the same political identity (ingroup members) as compared to responders with a different political identity (outgroup members). These effects are robust to additional controls and are significant in all six regressions. On average, proposers transfer 11.65% more of their endowment to an ingroup responder relative to an outgroup responder (Proposition 3d). The dummy variables d_2, d_3, d_4 (listed as Green, Labour, Lib Dem in Table 4) capture the difference in offers of proposers of different political identities relative to the benchmark of a Conservative proposer. Compared to a Conservative proposer, proposers of all other political affiliations offer a higher proportion of their endowment to the responder. Traditionally, the Conservatives in the UK, and their US counterparts, the Republicans, favor lower redistribution relative to Labour and Liberal Democrats in the UK, and their counterparts, the Democrats in the US. This result can be explained along the lines of Remark 3 by assuming different values of the parameter α_S for Conservative proposers relative to proposers of other identities. The addition of the 'Strength' variable does not affect the ingroup favoritism that proposers exhibit. This suggests that the degree of ingroup favoritism is not affected by the strength of the proposers identification with their party. The interaction of (1) Own and Strength variables and (2) Own and Entitlement variables were insignificant.

Result 3: Proposers offer a higher proportion of their endowment to responders who share their political identity, relative to a different political identity. This confirms the classic finding in social identity theory that ingroup members are treated more favorably than outgroup members.

One key element of our experimental design is that we are able to examine the effects of earned income and fiscal redistribution on prosociality, through our dummy variable d_6 (labelled "Entitlement" in Table 4). This variable is negative and significant in all regressions. Thus, proposers significantly reduce their offers (as a percentage of their after tax endowment) to responders when they earn their taxable endowments (Treatment 2) relative to the case of Treatment 1. When we use a Wilcoxon signed rank test to test the difference in offers between Treatments 1 and 2 for proposers of each political party when making an offer to a responder of the same party, we find that average offers are significantly lower in Treatment 2 relative to Treatment 1 ($p < 0.000$ for each pairwise comparison). However, Treatment 2 (taxable earned endowment) does not reduce the effect of social identity in proposer's offers in terms of ingroup favoritism. This confirms the predictions in Proposition 3d.

[14]These results are available from the authors on request.

Table 5: Descriptive Statistics: Responder MAOs

Responder MAOs	Anon	Green	Labour	Lib Dem	Con	UKIP
Treatment 1						
Mean	0.41	0.41	0.39	0.41	0.46	0.49
Median	0.49	0.49	0.49	0.49	0.5	0.50
Treatment 2						
Mean	0.36	0.36	0.34	0.37	0.39	0.43
Median	0.36	0.36	0.36	0.36	0.38	0.39

Summary statistics of responder MAO's as a percentage of the proposer's after-tax income for proposers of different identities

Result 4: The introduction of earned income under fiscal redistribution significantly reduces the average offers (expressed as a percentage of the proposer's incomes) made by proposers.

4.2 The behavior of responders

In this section, we analyze the minimal acceptable offers (MAO's) of the responders and it's correlates. As noted above, all MAO's are expressed as a percentage of the after-tax income of the proposers.

4.2.1 Descriptive Statistics

We now offer some descriptive statistics that do not condition on the political identity of the responders. Table 5 gives the summary data for the MAO's by responders taking into account the data from responders of all political identities.

In Treatment 1, the median MAO as a percentage of the proposer's after-tax endowment across all possible political identities of the proposer is almost 50% i.e., an equal share. However, in Treatment 2, following the introduction of earned income and fiscal redistribution, the median MAO as a fraction of the proposer's after-tax income is significantly reduced.

In contrast to the results for proposers, we have that for responders there is very little (unconditional) variation in MAO when faced with proposers of different political identities; this result holds for both treatments. The quantitatively weaker effect of social identity for responders is borne out by the regression analysis that we report later.

Table 6 reports 'pairwise differences' of *average responder MAO's* (i.e., averaged across all responder identities) to proposers with distinct political identities. These pairwise differences are tested using a Wilcoxon signed rank test. Each number in Table 6 shows

Table 6: Wilcoxon signed-rank tests: Responder MAOs

	Green	Labour	Lib Dem	Con	UKIP
Responders					
Anon	0	-0.01	0	0.06***	0.09***
Green	-	-0.02	0	0.05*	0.08***
Labour	-	-	-0.02	0.07***	0.10***
Lib Dem	-	-	-	0.05**	0.08***
Con	-	-	-	-	0.03***
Responders - Taxation					
Anon	0	-0.01	0.01	0.04**	0.07***
Green	-	-0.02	0.01	0.04*	0.07**
Labour	-	-	0.03	0.05**	0.09***
Lib Dem	-	-	-	0.02	0.06***
Con	-	-	-	-	0.04*

Wilcoxon Signed Rank Tests to test pairwise differences of average responder MAO's (as a fraction of the proposer's after-tax income) from proposers of two different political identities - the column proposer identity minus the row proposer identity, as a percentage of the proposer's income. Null Hypothesis: No difference in the MAO's made by responder to a proposer with a column identity and a proposer with a row identity. All tests are two sided. Stars denote significance levels; * ($p < 0.1$); ** ($p < 0.05$); *** ($p < 0.01$).

the average MAO requested from a proposer with the column identity minus the average MAO requested from a proposer with the row identity, and it could be positive or negative. For instance, the second entry in the column for Conservatives, 0.05, is the average MAO asked from a Conservative proposer minus the average MAO asked from a Green proposer, expressed as a fraction of the proposer's after-tax income.

We only find any significant pairwise differences in the MAO of the responder when the proposer has either a Conservative or UKIP identity; higher MAO's are required from such proposers (see last two columns of Table 6). Thus, without conditioning on the identity of the responder, we observe a bias against the right wing political identities. As in the case of Result 2, this result may be driven by the smaller number of data points that we have for right wing responders. Alternatively, it could be that Conservatives supporters are perceived to have higher average incomes and UKIP is considered too right wing; as noted earlier, this would fit into the explanation outlined in Remark 3. Pinpointing the exact reason, with a larger dataset, could be an interesting question for future research to address.

Result 5: The average MAO's of responders, when we do not condition on the political

Table 7: OLS Regressions: Responder MAOs

	(1)	(2)	(3)	(4)	(5)	(6)
Own	-0.067***	-0.067***	-0.067***	-0.067***	-0.067***	-0.067***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Green		-0.058	-0.067	-0.067	-0.061	0.010
		(0.041)	(0.044)	(0.044)	(0.042)	(0.069)
Labour		-0.014	-0.023	-0.023	-0.014	0.081
		(0.035)	(0.037)	(0.037)	(0.037)	(0.074)
Lib Dem		-0.082**	-0.091**	-0.091**	-0.081*	0.019
		(0.038)	(0.041)	(0.041)	(0.041)	(0.061)
Strength			-0.018	-0.018	-0.015	-0.016
			(0.016)	(0.016)	(0.016)	(0.019)
Entitlement				-0.054***	-0.054***	-0.054***
				(0.011)	(0.011)	(0.011)
Constant	0.418***	0.460***	0.499***	0.526***	0.445***	0.325**
	(0.015)	(0.028)	(0.050)	(0.051)	(0.069)	(0.130)
Demographics	No	No	No	No	Yes	Yes
Date	No	No	No	No	No	Yes
R^2	0.02	0.03	0.03	0.05	0.06	0.28
AIC	-302.84	-314.17	-314.22	-333.15	-352.47	-651.52
BIC	-292.48	-283.10	-277.97	-291.73	-295.51	-475.47
N	1,310	1,310	1,310	1,310	1,310	1,310
Subjects	131	131	131	131	131	131

OLS regressions. Dependent variable is Responders MAO. Standard errors in parenthesis clustered at the subject level. Demographics controls include age, gender and level of education. *** ($p < 0.01$); ** ($p < 0.05$); * ($p < 0.1$).

identity of the responders, are significantly increased when the Proposer has a Right wing political identity.

4.2.2 Regression analysis

We now run OLS regressions for the MAO of responders, conditioning on the political identity of the responders. We estimate a regression equation of the same form as (24) except that (i) the dependent variable y is now the MAO of responders, expressed as a percentage of the proposers post-tax endowment, and (ii) the variables are suitably altered to reflect the party affiliations of responders rather than proposers. All other explanatory variables are identical to those in (24) and have already been explained above.

Table 7 reports the regression results. We have dropped the interaction terms (Own with Entitlements and Own with Strength) in the Table, because these were highly insignificant. As was the case for proposer offers, we find that 'Own' (corresponding to d_1) is statistically significant and negative in all regressions. Responders consistently state a lower MAO when they share their political affiliation with the proposer. As noted above, in Corollary 1, this implies that the unobserved disadvantageous inequity parameter of the responder satisfies $\alpha_I < \alpha_O$, i.e., disadvantageous inequity is felt more strongly from outgroup members. This confirms the result with a student population in Chen and Li (2010) but we require fewer assumptions.[15]

Recall that the dummy d_4 equals 1 if the responder is a Liberal Democrat and zero otherwise; where the omitted category is the Conservative responder identity. Thus, Liberal Democrat responders, relative to Conservative responders, state a lower MAO, which is significant in 4 out of the 5 regressions reported in Table 7, although in the best regression in terms of AIC, this difference is not significant. The dummy variables d_2 and d_3 are never significant, i.e., Green and Labour responders do not ask for significantly different MAO's relative to a Conservative responder. Comparing these results with the behavior of proposer in Table 4, where all these variables are statistically significant, social identity plays a relatively stronger role for proposers. This asymmetric role of social identity for proposers and responders in an artefactual social identity experiment, is also, to the best of our knowledge, a new finding.

The treatment dummy d_6, labelled 'Entitlement' is negative and significant at 1%, which suggests that responders state lower MAOs (as a percentage of the proposers post-tax endowment) when the incomes of proposers are earned and taxed. This confirms the predictions in Proposition 2a.

As noted above, social identity appears to play a relatively stronger role for proposers. This finding is strengthened when we compare the quantitative sizes of the OWN variable in Tables 4 and 7; political identity has a more significant effect (quantitatively almost double) on the offers of proposers, relative to the MAO's of the responders. The constant term in Table 7 is highly significant at 1% in all regressions and accounts for the largest part of the quantitative effect on the MAO; all other explanatory variables have a smaller quantitative effect. This suggests that the MAO is likely to be affected by social norms of fairness to a larger extent as compared to social identity effects. However, the social identity effects improve our understanding of the responder decisions. A similar observation holds for the results from offers made by proposers (see the size and significance of the intercept term in Table 4).

[15]Chen and Li (2010) measure the actual sizes of α_I, α_O, but in order to do so they require the extra assumption that subjects play a mixed strategy in which each pure strategy is played with a probability given by the logistic form. We do not require such an assumption.

The findings on social identity for responders are summarized in the next result.

Result 6: The responders MAOs as a percentage of the proposers post-tax endowment are significantly lower when the proposer is an ingroup member compared to when the proposer belongs to the outgroup. We can also conclude that $\alpha_I < \alpha_O$, i.e., disadvantageous inequity is more onerous when it is with respect to an outgroup proposer. Social identity concerns are relatively more important for proposers.

Strikingly, as one moves from Treatment 1 to Treatment 2, the amount that the responders reduce their MAO by (5.4%) is almost equal to the amount by which the proposers reduce their offers (5.3%), both expressed as a percentage of the proposer's post-tax endowment. In conjunction, these results suggests that there might be a shared understanding of the responder's share in the presence of the proposer's entitlements to taxable income. Fehr and Schurtenberger (2018) highlight the 'shared understanding' aspect of a social norm. In this interpretation, our empirical results are consistent with there being a norm of behavior for prosocial sharing in the presence of taxes and redistribution.

5 Conclusion

In this paper, we use an artefactual experiment using the ultimatum game with registered members of British political parties, to study the influence of social identity on prosociality. Furthermore, we distinguish between unearned-untaxed income and earned-taxed-redistributed income in two different treatments in a novel experimental design. We derive our predictions from a simple, yet rigorous, theoretical model of social preferences and social identity, which offers a rich set of predictions that are then put to the test with our data.

We confirm the classic social identity predictions for proposers and responders. Proposer offers are significantly reduced when responders belong to a different political identity (outgroup members) relative to their own political identity (ingroup members). In parallel, responders when stating their minimum acceptable offers (MAOs) consistently state a lower MAO when matched with a proposer of their own identity. However, for proposers we find that their offers are conditional on their political affiliation. Compared to Conservative proposers, Green, Labour and Liberal Democrat proposers make significantly higher offers. For the responders MAO's are less conditional on political identity. We observe only a difference for the Liberal Democrats, whose MAOs are significantly lower than those made by a Conservative responder. Quantitatively we find that political identity plays a more significant role in the decisions of proposers, as compared to the decisions of the responders. We are also able to infer that, for responders, the disadvantageous inequity

parameter of Fehr-Schmidt preferences is higher when facing an outgroup proposer relative to an ingroup proposer.

The decisions of both proposers and responders are highly sensitive to treatment effects. In Treatment 1 the endowments are unearned and untaxed, while in Treatment 2 the endowments are earned, taxed, and redistributed. Proposer offers, as a percentage of their incomes, are reduced significantly as one moves from Treatment 1 to Treatment 2. Very interestingly, the MAO's of the responders, expressed as a percentage of the proposer's income, also fall by a nearly identical amount. This new finding suggests that there is a shared understanding of the appropriate offer and MAO in the presence of earned and taxed income. One potential explanation is that our subjects, fee paying British party members, are likely to be earning income and paying taxes, and are aware of social redistribution norms due to their heightened political identity. Hence, our experiments appear to have significant ecological validity to explain real world behavior.

On average, when we do not control for the political identity of the proposer, lower offers are made to responders of right wing parties as compared to left wing parties. A similar result holds for the MAO's asked by responders. However, this result might be driven by our smaller sample size of right wing parties or it could be explained by other factors based on social identity factors that we have suggested in the paper. For this reason, this result must be treated in a tentative manner. We find very little effect of demographic variables such as age, gender, and education on either the offers made by proposers or the MAO's stated by the responder. Experiments with student subjects often do find significant demographic/gender effects. It would be an interesting question for future research to examine the reasons for these differences between artefactual and lab experiments.

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6 Appendix: Experimental Instructions

Comments for the reader of our paper (and not our experimental subjects) are enclosed by **, for instance, **New Page**.

Subjects initially filled-in a consent form that highlighted several points such as voluntary participation, anonymity of data, and the use of the data for research purposes only.[16]

All Participants who gave consent are presented with the following demographic questions

Age

☐ 18-24

☐ 35-49

☐ 50-64

☐ 65+"

Gender

☐ Male

☐ Female

Political Affiliation

☐ Labour

☐ Liberal Democrat

☐ Green

☐ Conservative

☐ Ukip

How Strong is your support for the political party you affiliate with?

☐ Very Strong ☐ Strong ☐ Somewhat ☐ Weak ☐ Very Weak

New Page

The "Ultimatum Game" is played between two people; the PROPOSER and the RESPONDER. The PROPOSER is given £10 to divide between themselves and the RESPONDER. The PROPOSER'S offer is put to the RESPONDER. If the RESPONDER accepts the offer from the PROPOSER then they both receive this split. If the RESPONDER rejects the PROPOSER'S offer then they both receive £0. The final amounts that the PROPOSER and the RESPONDER receive is called the "outcome".

Example 1: Sally and James are playing the "Ultimatum Game". Sally is the PROPOSER, James is the RESPONDER. The PROPOSER is given £10. She proposes a split of £7 for herself and £3 for James, the RESPONDER. If the RESPONDER rejects this offer, how much will they both receive?

☐ Sally $7, James $3

☐ Sally $3, James $7

☐ Both receive $0

[16]We are happy to provide the details of the consent form on request.

Example 2: This time Sally, the PROPOSER, offers James, the RESPONDER, £5. The RESPONDER accepts this offer. How much do they both receive?

☐ Both receive $5

☐ Both receive $0

☐ Sally $0, James $5

New Page

You will now have the opportunity to play the "Ultimatum Game" in four different scenarios. One of these games will be selected at random and you shall receive the monetary outcomes from it based on the choices you make. The game that is randomly selected will be paired with another randomly selected participant in the study who is playing the opposite role to you. If you are a PROPOSER your match will be a RESPONDER. If you are a RESPONDER your match will be a PROPOSER. Payment details will be given at the end of the survey.

Subjects are randomly assigned as Proposer or Responder and remain in that role for the duration of the Experiment

We first give the instructions for Treatment 1, followed by the instructions for Treatment 2

Instructions follow for subjects in the role of Proposers

You are a PROPOSER

You face an anonymous individual, the RESPONDER and are asked to split £10 between yourself and the RESPONDER. You do not know anything about the person you are playing with. Please indicate how much you are willing to offer to the RESPONDER .

Slider Task here. For a screenshot when the responder has several possible political identities, please see Figure 1.

Here, you will play the "Ultimatum Game" five times.

You face five individuals, the RESPONDERS, one at a time. You are asked to split £10 between yourself and each of the RESPONDERS, making your decision one at a time. You do not know anything about the person you are playing with apart from their **political affiliation**. The political affiliation of each RESPONDER is indicated on the left. Please indicate how much you are willing to offer to each of the RESPONDERS.

Slider Task. See Figure 1 for a screenshot.

Instructions follow for subjects in the role of Responders

You are a RESPONDER.

You face an anonymous individual, the PROPOSER. The PROPOSER is asked to split £10 between themselves and you, the RESPONDER. You do not know anything about the person you are playing with. Please indicate **the amount below which you will reject** the PROPOSER'S offer.

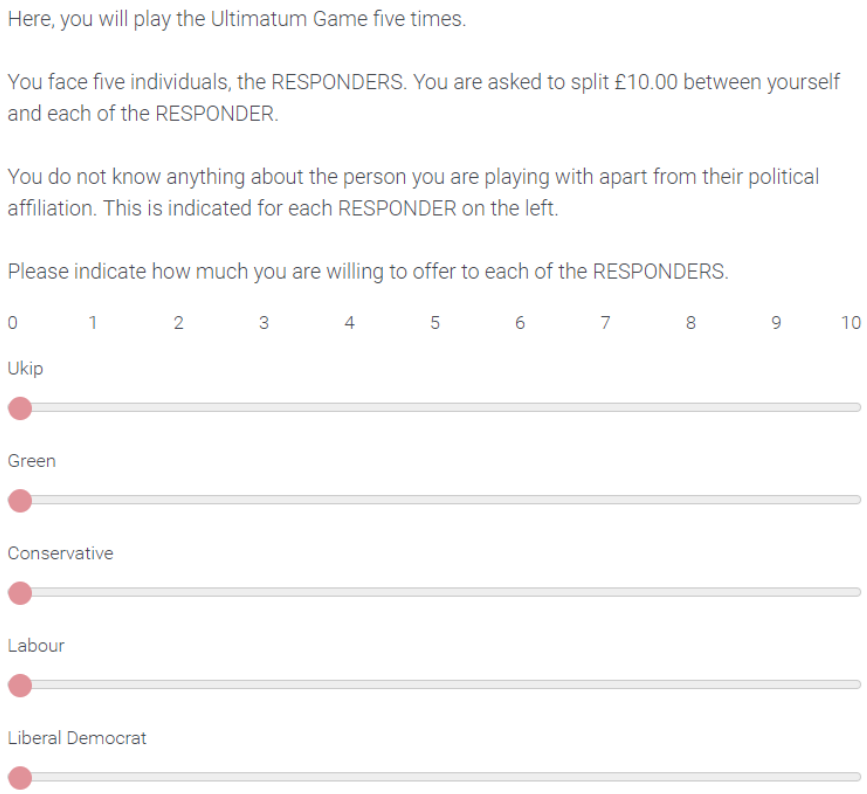

Figure 1: Slider task to determine the proposers offers for a responder of different political identities

Slider Task. For a screenshot when the proposer has several possible political identities, please see Figure 2.

Here, you will play the "Ultimatum Game" five times.

You face five individuals, the PROPOSERS, one at a time. Each PROPOSER is asked to split £10 between themselves and you, the RESPONDER. You do not know anything about the person you are playing with apart from their **political affiliation**. The political affiliation is indicated for each PROPOSER on the left.

Please indicate **the amount below which you will reject** each PROPOSER'S offer.

Slider Task. See Figure 2 for a screenshot.

This concludes the experimental instructions for Treatment 1. Below are the experimental instructions for Treatment 2 in which proposers could earn their endowments and these endowments are taxed and partly redistributed.

Proposers are shown the following screens

You the PROPOSER have the opportunity to earn some extra money, over and above

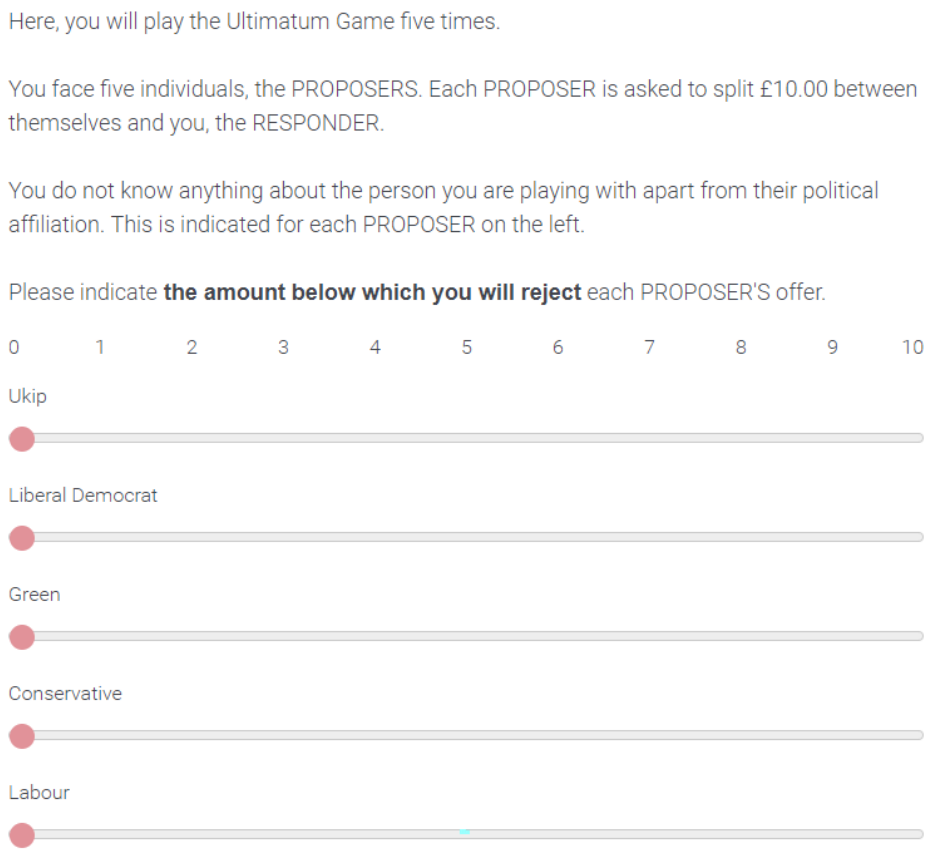

Figure 2: Slider task for responders to decided on their MAO's for a proposer with different political identities.

your £10, to play the upcoming Ultimatum Game.

You must answer 5 questions. If you answer 4 or more correctly you play the Ultimatum Game with £20. If you answer less than 4 correctly you will play the Ultimatum Game with £10.

The five questions follow.

$45 + 21 + 9 =$

$43 + 18 + 21 =$

$57 + 9 + 20 =$

$24 + 53 + (2 \times 4) =$

$(17 + 18)/2 =$

**Depending on the number of Questions answered correctly subjects are shown one of the two statements: "You have earned £20 to play the Ultimatum Game." "You have

earned £10 to play the Ultimatum Game."

New Page

First we give the instructions for proposers who play the ultimatum game with £20

You face an anonymous individual, the RESPONDER and are asked to spit £20 of your earned income between yourself and the RESPONDER.

HOWEVER, your income is subject to a tax rate of 30%. You are left with an after-tax income of £14.

50% of your tax payment is redistributed and is given to the RESPONDER. The RESPONDER will receive £3.

You are now asked to split your after-tax income with the RESPONDER. You do not know anything about the person you are playing with. Please indicate how much you will offer to the RESPONDER.

The remaining instructions for the proposer are as in Treatment 1, so we omit them.

Now we give the instructions for proposers who play the ultimatum game with £10

The only difference from the case where the proposer has £20 is given in the following instructions

You face an anonymous individual, the RESPONDER and are asked to spit £10 of your earned income between yourself and the RESPONDER.

HOWEVER, you are subject to a tax rate of 30%. You are left with an after-tax income of £7

50% of your tax payment is redistributed and goes to the RESPONDER. The RESPONDER will receive £1.50.

The remaining instructions are as for a Proposer with an income of £20, hence, are omitted here

**This is followed by instructions for Responders. These instructions are identical to those described in Treatment 1, so these are omitted. Responders were fully aware of the taxation and redistribution of the Proposer's income in Treatment 2. **

Thank you for taking the time to answer the decision part of the survey. Please could you now take a few minutes to complete some follow up questions.

What is your Marital Status?

☐ Single

☐ Married or Domestic Partnership

☐ Divorced

What is your Occupation?____

What is the highest level of schooling you have completed?

☐ Higher Degree (e.g. MSc or PhD)
☐ Degree (including foundation degrees and PGCE)
☐ A-level, Vocational level 3 and equivalent
☐ GCSE/O-level, Vocational level 2 and equivalent
☐ Other Qualifications
☐ No Qualifications

To try to ensure we have surveyed a representative population of the area please leave your postcode (optional)._____

Thank you for your time. Payments will be made via PayPal, all that is required is your email address. Please provide this below.
Alternatively, if you wish to receive your payments via an alternative method, e.g. postal cheque please leave these details.
All payments made will be the outcome of the randomly selected round of the "Ultimatum Game".
If payments for your outcome are delayed, they will be subject to an interest rate paid for the delay in line with the Bank of England base rate. This will be added to your payment.