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Abstract

Representing others brings responsibility and fear of letting others down (social regret). We incorporate these phenomena in a theoretical model and provide a psychological perspective to explain the individual-group discontinuity in risk-taking activities. A representative makes a state-wise comparison of the consequences of her decision and an unchosen advice given by a group member. Social regret-aversion renders extreme utility differences salient and allows both risky and cautious shifts.

Keywords: Social representation; Social regret-aversion; Risk-taking; Individual-group discontinuity; Risky shift; Cautious shift.

JEL Codes: D03; D81; A13

1. Introduction

Individuals and groups often make decisions under risk. Standard economic models have treated groups as if they were individual decision-makers. However, the experimental evidence shows the presence of individual-group discontinuity and reports mixed findings regarding risky and cautious shifts (Charness and Sutter, 2012.)

The present analysis focuses on a particular context, in which: (i) each group delegates its decision to a group member, who takes a binding decision, (ii) each group member, including the representative, receives a common payoff,[1] and (iii) representative receives non-binding advice from their group members (preference communication). Under (i) and (ii), there is no strategic interaction among group members. Thus, the standard theory would predict the representative's behavior to exactly correspond to the individual behavior, irrespective of whether communication is allowed (iii). However, a representative not only plays for herself, but also for her group members and, thus, she might feel responsible for her group members.

Charness and Jackson (2009) reported that such sense of responsibility influences 1/3 of the representatives. Among them, 90% adopted a safe strategy in a stag hunt experiment. Song (2008) found that representatives trust much less than individuals in a trust game.[2] These authors suggested that representatives could be "guilt-averse" (Charness and Dufwenberg, 2006) towards the people they represent and they often aim at "better representing" them. Ertac and Gurdal (2016) noted that representatives also enjoy generating a high payoff for the group.

Motivated by these insights, we propose a theoretical model to assess the impact of responsibility and representative's *social* regret on risk-taking behavior when the interaction between group members is non-strategic. Therefore, we provide a psychological perspective to explain individual-group discontinuity. Our model builds on Loomes and Sugden's (1982) *individual* regret theory (LS, hereafter), in which people could anticipate the regret and elation derived by not choosing an alternative. In our

[1] The introduction of a common payoff is a simplifying assumption commonly used in the relevant experimental papers.
[2] On the other hand, Sutter (2009) finds that representatives risk more often than individuals in a lottery choice experiment either with or without preference communication.

model, representatives experience regret (or elation) by not following a group member's advice that would have led to a higher (lower) payoff. [3]

We assume that regret and elation are greater for larger utility differences between what a group receives based on the representative's decision and what the same group could have received from another action, as advised by some group member. When the utility difference increases linearly, the representative is *social regret-neutral* and acts as if she was maximizing her expected utility (Proposition 1). On the other hand, if the utility difference increases more than proportionally, the representative is *social regret-averse.* Our main result (Proposition 2) indicates the conditions under which risky or cautious shifts prevail for social regret-averse representatives.

2. Model

A representative, chosen from a group of $n + 1$ people, has to decide between a risky (x_R) and a safe (x_S) decision.[4] She believes, objectively or subjectively, that x_R has a high return a with probability p and a low return c with probability $1 - p$. x_S returns b and $a > b > c$.

The representative's utility function depends on her decision and the group members' advice. The regret-augmented utility is expressed as follows:

$$V(d|m, p) \equiv u(d|p) + \eta(d|m, p), \qquad (1)$$

where $d \in \{x_R, x_S\}$ is the representative's decision and $m \equiv (m_1, \dots, m_n)$ is the vector of her group members' advice (messages); $m_i \in \{x_R, x_S\}$ for any i, and n^R and n^S are the numbers of risky and safe suggestions, respectively. The first term, $u(d|p)$, is the individual (expected) utility, assumed as continuous. The second term is the regret utility, which is the sum of the representative's regret and elation experienced by not following a group member j's advice under possible states $s \in S$, where S is the set of states:

$$\eta(d|m, p) \equiv \sum_{j=1}^{n} \sum_{s \in S} \mathbb{P}_s \, R\left(f_s(d) - f_s(m_j)\right). \qquad (2)$$

[3] We can also interpret m as the representative's beliefs on her group members' preferences.

[4] Representatives can face more general choice sets instead of only two choices, as in Quiggin (1994).

A representative believes that each state $s \in S$ happens with probability $\mathbb{P}_s$. In our setup, there are two states. $S = \{H, L\}$: x_R returns a *high* payoff with probability p and *low* payoff with probability $1 - p$.[5] The choiceless utility function, $f_s: \{x_R, x_S\} \rightarrow \Re$, evaluates the outcomes of the representative's decision or a member's advice at $s \in S$. The regret-elation function, $R(.)$, indicates regret (for $\varepsilon > 0, R(-\varepsilon) < 0$) and elation ($R(\varepsilon) > 0$) for not having followed a member's decision.

Assumption: $R(\cdot)$ is continuous, strictly increasing, with $R(0) = 0$, and three times differentiable.

To explore the implications of the messages for the delegate, we, first, focus on evenly distributed messages, $m^{=}$, such that $n^R = n^S = n/2$, and, then, we discuss the implications of unevenly distributed messages. Following LS, we define $Q(.)$ as an increasing and skew-symmetric function, such that, for all ε, $Q(\varepsilon) = \varepsilon + \frac{n}{2}R(\varepsilon) - \frac{n}{2}R(-\varepsilon)$.[6] Given $m^{=}$ and p, $V(x_S|m^{=}, p) \geq V(x_R|m^{=}, p)$ if and only if:

$$\sum_{s \in S} \mathbb{P}_s \left[Q\left(f_s(x_S) - f_s(x_R) \right) \right] \geq 0. \qquad (3)$$

We define the utility differences of two actions in the states H and L as $z_H \equiv f_H(x_R) - f_H(x_S) > 0$ and $z_L \equiv f_L(x_S) - f_L(x_R) > 0$, respectively.

3. Results

Lemma 1: There exists a critical belief, p^C, such that:

$$\text{for } p \lesseqqgtr p^C, \eta(x_S|m^{=}, p) \gtreqqless \eta(x_R|m^{=}, p).$$

Lemma 1 states that the representative's belief on the likelihood of state H determines how she evaluates her regret utility. While a belief lower than the critical level p^C elevates x_S, a higher belief elevates x_R.

Next, we study the implications of social regret-neutrality and aversion. First, we assume $R(\cdot)$ to be linear, implying $Q(.)$ to also be linear.

Proposition 1 (Social regret-neutrality):

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[5] İriş et al. (2016) apply this concept to a public goods game with more than two states where representatives can contribute to reach a threshold to avoid an uncertain common loss.
[6] Skew symmetry: for all $\varepsilon, Q(\varepsilon) = -Q(-\varepsilon)$.

For $R(\cdot)$ linear:

$$u(x_S|p) \lesseqgtr u(x_R|p) \Leftrightarrow \eta(x_S|m^=, p) \lesseqgtr \eta(x_R|m^=, p) \Leftrightarrow V(x_S|m^=, p) \lesseqgtr V(x_R|m^=, p).$$

Proposition 1 shows that a representative's regret utility $\eta(\cdot)$ for $m^=$ reinforces its standard utility $u(\cdot)$ for a linear $R(\cdot)$, expressing social regret-neutrality.

Second, we assume $Q(.)$ to be convex in $\mathbb{R}^+$, i.e., for all $\varepsilon > 0, R''(\varepsilon) > R''(-\varepsilon)$. This assumption is empirically confirmed for individual regret.[7]

Proposition 2 (Social regret-aversion):

Let $u(\cdot)$ be continuous and $\bar{p}$ be the critical belief under a linear $R(\cdot)$. For $Q(.)$ convex on $\mathbb{R}^+$:

- **i.** If $z_H > z_L$, then there exist some $p \in (p^C, \bar{p})$ such that $u(x_S|p) > u(x_R|p)$, $\eta(x_S|m^=, p) < \eta(x_R|m^=, p)$, and $V(x_S|m^=, p) < V(x_R|m^=, p)$;
- **ii.** If $z_H < z_L$, then there exist some $p \in (\bar{p}, p^C)$ such that $u(x_S|p) < u(x_R|p)$, $\eta(x_S|m^=, p) > \eta(x_R|m^=, p)$, and $V(x_S|m^=, p) > V(x_R|m^=, p)$.

Proposition 2 shows that a social regret-averse representative values more the state with larger utility differences and, thus, her regret utility favors the action promoting a higher utility in this state. If the utility difference is greater in state H $(z_H > z_L)$, then we can find a social regret-averse representative who individually prefers a safe action, $u(x_S|p) > u(x_R|p)$. However, once she receives $m^=$, she anticipates higher regret than elation when choosing the safe action x_S $(\eta(x_S|m^=, p) < \eta(x_R|m^=, p))$, and eventually shifts towards the risky action, $V(x_S|m^=, p) < V(x_R|m^=, p)$. The opposite case is also possible if $z_H < z_L$. Therefore, the social regret-aversion allows both risky and cautious shifts.[8]

4. Discussion

For unanimous messages, $m^R \equiv (m_R, \dots, m_R)$ or $m^S \equiv (m_S, \dots, m_S)$, one needs to compare $\eta(x_S|m^R, p)$ or $\eta(x_R|m^S, p)$ with the zero-regret utility. These conditions exactly correspond to the condition for $m^=$ and produce identical results.

[7] See Bleichrodt and Wakker (2015) for a detailed discussion and applications of LS.

[8] For a social regret-seeking representative, with concave $Q(.)$, the relation of regret utilities in Proposition 2 would be reversed.

For other unevenly distributed messages $m^{\neq}$, we obtain:

$$V(x_S|m^{\neq},p) \geq V(x_R|m^{\neq},p) \Leftrightarrow$$

$$p\big(-z_H + n^R R(-z_H) - n^S R(z_H)\big) + (1-p)\big(z_L + n^R R(z_L) - n^S R(-z_L)\big) \geq 0. \quad (4)$$

Without loss of generality, a higher n^R and a lower n^S might not have any impact depending on the specifications of $R(\cdot)$. Even if there is, then it depends on whether $z_H > z_L$ or $z_H < z_L$ holds, elevating risky or safe actions, respectively, in line with Proposition 2. This also suggests that a representative does not conform to a certain action when more people suggest it. We can capture a representative's conformational pleasure by assuming $R(0) > 0$. In this case, $(n^S - n^R)R(0)$ enters the left-hand side of (4).[9]

5. Conclusions

To analyze the group representatives' risk-taking behavior, we proposed a social regret model along the lines of LS's individual regret framework. A representative makes a state-wise comparison of the consequences of the decision she makes and unchosen advice by group members. Social regret-aversion makes the extreme utility differences particularly salient and allows both risky and cautious shifts.

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[9] Note that one cannot define skew symmetric function $Q(.)$ for $m^{\neq}$.

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Appendix: Proofs

Proof of Lemma 1: The condition below shows that $\eta(x_S|m^{=},p) > \eta(x_R|m^{=},p)$:

$$p\frac{n}{2}R(-z_H) + (1-p)\frac{n}{2}R(z_L) \geq p\frac{n}{2}R(z_H) + (1-p)\frac{n}{2}R(-z_L) \Leftrightarrow$$

$$p\big(R(-z_H) - R(z_H)\big) + (1-p)\big(R(z_L) - R(-z_L)\big) \geq 0. \qquad \text{(A.1)}$$

The first term favors x_R and the second favors x_S. Thus, there is a unique $p = p^C$ such that (A.1) holds with equality. For any $p < p^C$, the inequality (A.1) holds strictly as it increases the weight of the elation term and decreases the weight of the regret term associated with choosing x_S. For any $p > p^C$, the opposite holds strictly.

Proof of Proposition 1:

The condition $V(x_S|m^{=},p) \geq V(x_R|m^{=},p)$, expressed in (3), can be written as follows:

$$p\left(-z_H + \tfrac{n}{2}R(-z_H) - \tfrac{n}{2}R(z_H)\right) + (1-p)\left(z_L + \tfrac{n}{2}R(z_L) - \tfrac{n}{2}R(-z_L)\right) \geq 0. \qquad \text{(A.2)}$$

For $R(\cdot)$ linear:

$$-p(n+1)z_H + (1-p)(n+1)z_L \geq 0 \Leftrightarrow p \leq \tfrac{z_L}{z_L+z_H}. \qquad \text{(A.3)}$$

For $z_H = a - b$ and $z_L = b - c$, the critical belief in (3) becomes identical to the utility without regret, $p \leq \frac{b-c}{2b-a-c}$. Note also that the condition $\eta(x_S|m^{=},p) \geq \eta(x_R|m^{=},p)$ leads to an identical critical belief.

Proof of Proposition 2:

The assumption on $Q(.)$ being convex in $\mathbb{R}^+$ strengthens both the terms in (A.2) as compared to a linear $Q(.)$, implied by a linear $R(\cdot)$. The first term favors the risky action, x_R, and the second term favors the safe action, x_S. The size of the utility differences, z_H and z_L, determines which option dominates the other:

i. If $z_H > z_L$, the critical belief in (3) becomes $p^C < \bar{p}$. At $p = \bar{p}$, $u(x_S|\bar{p}) = u(x_R|\bar{p})$ by (A.2), and $\eta(x_S|m^{=},\bar{p}) < \eta(x_R|m^{=},\bar{p})$, since $p = \bar{p} > p^C$. Therefore, $V(x_S|m^{=},\bar{p}) < V(x_R|m^{=},\bar{p})$. By the continuity of $R(\cdot)$ and $u(\cdot)$, for some $p = \bar{p} - \varepsilon$, where $\varepsilon > 0$, we have $u(x_S|p) > u(x_R|p)$, $\eta(x_S|m^{=}, p) < \eta(x_R|m^{=}, p)$, and $V(x_S|m^{=}, p) < V(x_R|m^{=}, p)$.

ii. If $z_H < z_L$, the critical belief in (3) becomes $p^C > \bar{p}$. At $p = \bar{p}$, $u(x_S|\bar{p}) = u(x_R|\bar{p})$ by (A.2), and $\eta(x_S|m^{=}, \bar{p}) > \eta(x_R|m^{=}, \bar{p})$, since $p = \bar{p} < p^C$. Therefore, $V(x_S|m^{=}, \bar{p}) > V(x_R|m^{=}, \bar{p})$. By the continuity of $R(\cdot)$ and $u(\cdot)$, for some $p = \bar{p} + \varepsilon$, where $\varepsilon > 0$, we have $u(x_S|p) < u(x_R|p)$, $\eta(x_S|m^{=}, p) > \eta(x_R|m^{=}, p)$, and $V(x_S|m^{=}, p) > V(x_R|m^{=}, p)$.