Discounting the future: The effect of collective motivation on investment decisions and acceptance of policies for renewable energy

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Abstract

Previous research has mainly considered economic factors and personal psychological factors (e.g., personal pro-environmental attitudes) as determinants of investment behavior for renewable energies. However, less is known about how social identities, i.e. the human capacity to think and act as a member of a social group, can shape green investment behavior. Combining insights from economics and psychology, the current research investigates if collective pro-environmental motivation (e.g., pro-environmental ingroup norms, collective climate efficacy beliefs) can uniquely add to the explanation of investment decisions and the acceptance of policies for renewable energies. Results from a multi-country survey (31 European countries, N = 18,037), including a discrete choice experiment, showed that collective pro-environmental motivation was positively correlated with the acceptance of green energy policies and negatively correlated with discounting of future benefits (money discount rate) in investment decisions for renewable energies. Importantly, collective pro-environmental motivation remained a significant predictor of policy acceptance and the discount rate after controlling for personal pro-environmental motivation. Furthermore, the associations between collective pro-environmental motivation and our outcome measures were stronger for respondents highly identified with their group compared to low identifiers. Our findings suggest that collective pro-environmental motivation provides a unique opportunity to increase support for and participation in the transformation towards carbon-neutrality.

Keywords: social identity, pro-environmental behavior, policy acceptance, renewable energy investment, social norms, collective efficacy, discount rate

Introduction

Scientific forecasts show that the ecological, social and economic consequences of continued global warming will be dramatic [1]. Previous calls to action to stop global warming were ineffective or insufficient. Why is this the case? Perhaps, the wrong actions were addressed. Environmental behavioral sciences and interventions have long been focusing on explaining and changing private (consumption) behavior as a personal decision of individuals [2–4].This might have been wrong-headed and insufficient for two reasons.

First, the urgency and scale of global environmental degradation require the immediate transformation of societies' production and consumption systems. Specifically, dramatic changes in the infrastructural, economic, and legal boundary conditions of individuals' behavior are needed to enable large-scale changes in private environmentalism across different societal milieus and groups. This is because current structures often discourage or disable pro-environmental behavior options as ecologically sustainable products or services are not offered or only at high personal costs in terms of money, effort, or safety (e.g., biking is often perceived as dangerous in car-crowded cities, and frequent public transport connections are often missing in rural areas). At the same time, dynamics of free-riding and commons dilemma situations [5–7] require regulations and prohibitions to induce people making personally costly contributions to the common (environmental) good [8, 9]. As a consequence, understanding and changing individuals' environmental behavior needs a focus on structural changes [10]. This does not mean, however, that investigating and supporting pro-environmental action in individuals is not important. The opposite is true. It is just pivotal to look at the relevant types of action. Thus, instead of limiting the focus to private consumption, behavioral sciences urgently need to understand when, how, and why individuals support or oppose societal and economic transition processes. These actions may include the passive acceptance of green policy measures (e.g. increased taxes on fossil fuels), but also more active behaviors like participation in collective environmental projects, such as investment in renewable energy sites. In the realm of economic

behavior, much more than through individual pro-environmental consumption, a person might be able to effectively support the transformation towards carbon-neutrality by investing money in green businesses. In other words, behavioral sciences are now needed to explain individuals' actions that are directed on changing the system, and not just their personal environmental behaviors. This is why the present research seeks to explain the psychological and economic drivers of both the acceptance of environmental policies and personally costly investment decisions in green businesses, such as financial investments in renewable energy projects.

There is a second reason why the current focus on personal behavior decisions is insufficient. It refers to an inaccurate conception of individuals' behavior as a solely personal decision that is driven by personal cost-benefit analyses, personal morals, and personal capabilities. If environmental action would be a solely personal decision, probably, people would never start to act. This is because the current large-scale environmental crises that burden people [11, 12] did not emerge, and cannot be solved by, an individual's action alone. In the global North, it even does not threaten most individuals' current personal well-being, but that of the many generations of people to come. Obviously, environmental crises such as climate change, are solely collective, but not personal, problems. So, why should people act? We propose that they do so, nevertheless, because their basic psychic design implies that humans think and act as group-members instead of idiosyncratic and isolated persons [13, 14]. That is, people act upon collective problems on the ground of their identification with, and their perception of, a collective they categorize themselves as [15]. Collectives may refer to groups from different levels of inclusiveness, ranging from small activist groups to very inclusive social categories (e.g. generational or national groups; [16]). Then, group-members' environmental cognition and action depends on whether they consider their group as being in favor of pro-environmental action and as having the capabilities to significantly affect environmental crises [17]. Recently, such theorizing on collective pro-environmental motivation has been introduced to the study of pro-environmental behavior [15, 18, 19].

Building on the Social Identity Approach [13], this work indicates that collective pro-environmental motivation may be an important, but sometimes overlooked factor in transition processes towards carbon-neutrality [20].

The present research aims to shed light on the question, how the human capacity to think and act as social group members uniquely shapes people's efforts to mitigate large-scale environmental crises. Extending previous work, we target environmental behaviors that are more directly related to structural changes, namely acceptance of environmental policies and the subjective discount rate in investment decisions for renewable energies. The discount rate is an important factor to consider in investment behavior as it represents the time preference for consumption and reflects the opportunity cost of a specific investment, such as an investment in a renewable energy project. A high discount rate would result in a lower present value of future benefits from the investment, making it less attractive to private or public investors. In contrast, a low discount rate would increase the present value of future benefits and make the investment more appealing. The subjective discount rate can have a significant impact on the pace and success of the transformation towards a carbon-neutral future, as it determines the perceived value and feasibility of investments in green businesses. Economic research on (subjective discount rates in) investment in renewable energy projects has mainly focused on the role of markets and incentive-based policies, for example how to design feed-in tariffs to induce efficient investments into renewable electricity generation [21, 22]. However, less is known about the effects of collective psychological factors on investment decisions. Bringing together economic and psychological research, the present work aims to provide novel and interdisciplinary insights into how collective pro-environmental motivation may affect the investment behavior and the acceptance of policies for renewable energies and - as a consequence - may increase private engagement for the transformation towards carbon-neutrality.

Social identity and pro-environmental behavior. Psychological research investigating the cognitive and motivational drivers of people's pro-environmental behavior has tended to focus on personal beliefs and motivation, such as personal environmental attitudes, perceived personal behavior costs or (personal) self-efficacy beliefs. However, we need to consider collective cognition and motivation as well, i.e. the switch from the personal 'I' to the collective 'we', if we aim to understand and support people's pro-environmental behavior [15, 19, 23, 24]. Recently, environmental psychology has started to investigate the effects of collective motivation on pro-environmental conduct. In line with the Social Identity Approach [13], this work proposes that – if certain conditions are met – individuals think and act in terms of their group membership (social identity) when appraising and responding to environmental problems. This self-categorization as a group member increases the importance of collective motivation for pro-environmental behavior.

But how exactly does group membership affect environmental appraisal and behavior? Models of collective pro-environmental action, such as the Social Identity Model of Pro-Environmental Action (SIMPEA; [15]), describe three key factors that influence how group members respond to perceived environmental crisis: ingroup norms and goals, collective efficacy beliefs, ingroup identification. Specifically, SIMPEA proposes that individuals are more likely to act in a pro-environmental manner if the norms and goals of their group support such behavior, particularly for members who are highly identified with their group. Similarly, collective environmental efficacy beliefs, i.e. the perception that the ingroup is capable (or not) to achieve its pro-environmental goals, should affect pro-environmental action. If the group is perceived as agentic and capable to achieve its pro-environmental goals, group members, especially high identifiers, should be more motivated to engage in pro-environmental action. However, collective factors may also influence how individuals appraise environmental issues. For example, social identities may increase or decrease acceptance of anthropogenic climate

158 change, depending on whether (or not) climate change denial is perceived as prototypical for
159 the salient group [25] .

160 A growing body of research has shown that collective pro-environmental motivation
161 can foster people's pro-environmental behavior, albeit less work has been carried out regarding
162 the effects of collective motivation on appraisal processes (see [17, 18], for recent reviews). For
163 example, increasing the salience of their political identity reduced acceptance of anthropogenic
164 climate change and climate action intentions among self-identified political right-wingers [26].
165 Similarly, environmental ingroup norms, i.e. norms supportive or not supportive of pro-
166 environmental behavior, were found to affect pro-environmental action intentions across
167 different behavioral domains, including mobility behavior, energy-saving behavior, recycling
168 or sustainable food choice [27–29]. Importantly, the effects of ingroup norms on action
169 intentions were stronger for individuals highly identified with their group compared to low
170 identifiers [30, 31]. Corroborating these findings, meta-analytic results indicated that stronger
171 endorsement of a social identity with clear climate-protective norms was associated with higher
172 behavioral intentions to fight climate change or self-reported climate-protective behavior [32].
173 Finally, strong beliefs about the ingroup's capability to mitigate climate change increased
174 climate-protective private consumption behavior as well as climate activist behavior [33–35].
175 Notably, the effects of collective pro-environmental motivation on pro-environmental action
176 are not limited to groups inherently related to environmental issues (e.g. environmental activist
177 groups), but were also observed for broader social categories (e.g., community identification;
178 [36]). This suggests that social identities may provide a point of entry for interventions to foster
179 pro-environmental action across different social contexts. The majority of the studies on
180 collective pro-environmental motivation and pro-environmental behavior, however, have
181 targeted private consumption behaviors or activist behavior (Fritsche et al., 2018). In contrast,
182 fewer work has investigated the effects of collective pro-environmental motivation on
183 economic behavior, such as decisions about investment in green businesses or acceptance of

green, but relatively costly policy measures [37]. Applying the social identity perspective to the study of green investment behavior may be a timely endeavor, as raising investment in green businesses can be considered a key strategy to facilitate the transformation towards carbon-neutrality.

Economic research on investment behavior for renewable energies. From the economics perspective, an investment into a renewable energy project is profitably done if its present value exceeds the costs of the investment. This present value depends on the cash flow of the project. A large literature asks how to design economic instruments that increase the cash flow in order to set the correct investment incentives (reviewed in [21, 38]). In addition, the present value of a renewable energy project depends on the discount rate applied to the future payments. In more psychological terms, a subjective discount rate represents the (reduced) present value people assign to investment outcomes they expect only for the future, not for today. As an example, imagine the choice between receiving €100 today or €100 in one year. If the discount rate is 5%, the €100 somebody receives in one year is worth less to this person today, or in other words, €100 in one year is equivalent to €95.23 today ($€100 / (1 + 0.05) = €95.23$). The larger the subjective discount rate, the less favorable an investment becomes. Higher discount rates thus make investments with long-term payouts or benefits, such as benefits for future generations, substantially less attractive. As a consequence, the subjective discount rate could be a crucial factor influencing support for private and public investments for the transformation towards carbon-neutrality. While there is a growing body of literature showing that individual discount rates are shaped by personal and contextual circumstances [39, 40], much less is known about how social identities and collective motivation affect discount rates and, hence, investment strategies.

Present research. The present research investigates the effects of personal and collective pro-environmental motivation on efforts to support the transformation towards carbon-neutrality. Previous work in environmental psychology has often focused on private

consumption behaviors (e.g., recycling, private mobility behavior) and on personal-level variables when predicting pro-environmental behavior (e.g., personal attitudes; [41]). The present research extends these studies by testing how collective pro-environmental motivation (e.g., perceived ingroup norms supportive of pro-environmental action, collective environmental efficacy beliefs) may influence behaviors that are more directly related to changes in our production and consumption patterns. Specifically, we examine if collective pro-environmental motivation can uniquely add to the explanation of investment decisions and acceptance of policies for renewable energies. We use investment in renewable energy projects as a key possibility for individuals to contribute to the transformation towards carbon-neutrality. The key parameter for private or public decision-making in such climate-related investments is the subjective discount rate [42–45] which converts future payoffs into a present-day equivalent value. The subjective discount rate thereby takes into account the time value of money and other factors.

Using data from a multi-country survey in 31 European countries (N = 18,037), we test if personal pro-environmental motivation (H1a) and collective pro-environmental motivation (H1b) are negatively associated with subjective money discount rate in a choice experiment on investment in renewable energy projects and positively associated with acceptance of green energy policies (personal motivation: H2a, collective motivation: H2b). In line with social identity theory, we also examine if the effects of collective pro-environmental motivation on discount rate (H3a) and policy acceptance (H3b) are stronger for participants with a strong identification with their group compared to low identifiers. Although the primary focus of the present research is on collective pro-environmental motivation, we explore if the expected correlations between collective pro-environmental motivation and our two outcome variables remain significant after controlling for personal pro-environmental motivation. In other words, we examine if collective motivation can uniquely add to the explanation of investment decisions and policy acceptance.

Materials and Methods

Survey and participants. We use data from an online multi-country survey collected in the ECHOES Horizon 2020 project (echoes-project.eu; [46]). The survey region covered 31 European countries (EU 27, Norway, Switzerland, Turkey, UK) and the online questionnaire was administered by a market research company. All survey materials were presented to the participants in their native language and monetary values were translated from Euros into an equivalent value of national currency, where applicable. About 600 respondents were recruited in each target country using quota sampling methods to ensure that the samples were representative with regard to income, age and gender. The total sample amounted to 18,037 completed questionnaires. Participants received a compensation of €5 after completing the questionnaire. Table I presents a summary of the socio-demographic indicators of the survey sample.

Ethics statement. The survey task was approved under the ethics oversight of the European Union funded ECHOES Horizon 2020 project, and was compliant with the data management plan and project handbook thereof .

Table I: Respondent socio-demographic characteristics

Characteristic	Description	Mean	Median	Min	Max
Age 18-34	respondent age 18-34	0.35	0	0	1
Age 35-44	respondent age 35-44	0.23	0	0	1
Age 45-54	respondent age 45-54	0.20	0	0	1
Age 55+	respondent age 55+	0.23	0	0	1
Male	=1 if respondent identifies as male	0.51	1	0	1
Household size	number of residents in the household	2.74	3	1	6
Kids	=1 if there are children under age 14 in the household	0.60	1	0	1
Employed	=1 if a person is full or part-time employed	0.62	1	0	1
University	=1 if a respondent has an university or equivalent degree	0.48	0	0	1
Income	estimated net monthly income based on income tranches in 1000's	2.02	1.5	0.02	8.18

Questionnaire and measurement of psychological variables. The questionnaire included information on respondents' socio-demographic situation, their decisions in a choice experiment to invest in renewable energy projects, as well as items on respondents' pro-environmental and energy-related attitudes, beliefs, personal norms and behaviors (and behavioral intentions). Participants were also asked to answer a number of group-related items on energy norms, efficacy beliefs and behaviors as well as their social identification for different social ingroups (see [46], for the full survey). For this, participants were randomly assigned to respond to group-based questions that referred to one out of three social ingroups: their municipality ($N = 5919$), their country ($N = 6007$), or Europe ($N = 6111$). For the current research, we use items on *personal pro-environmental motivation* and *group pro-environmental motivation* as predictor variables. Our central outcome measures are the subjective money discount rate (see description of the choice experiment below) and the acceptance of green energy technologies. If not indicated otherwise, all items were measured on five-point scales, ranging from 1 = "strongly disagree" to 5 = "strongly agree".

Acceptance of green technologies was assessed with one item ('I would accept energy policies that protect the environment even when these induce higher costs, e.g., policies that increase the prices of fossil fuels.'). This variable will henceforth be called *Acceptance*. *Personal pro-environmental motivation* includes two items on personal norms to save energy and to support the energy transition (example item: 'I feel a personal obligation to support energy policies that support the energy transition.'), a single item on environmental self-identity ('Acting pro-environmentally is an important part of who I am.') as well as a graphical measure of inclusion of nature in self (adapted from [47]), a single item on self-efficacy beliefs to support the energy transition ('As an individual, I can do a lot to support the energy transition.') and two items on climate change beliefs ('Most scientists say that the world's temperature has slowly been rising over the past 100 years. Do you think this has been happening?', ranging from 1 = "No, definitely not" to 5 = "Yes, definitely"; 'Assuming that the world's temperature

is rising, do you think this is caused mostly by natural causes, about equally by natural causes and human activity, or mostly by human activity?', ranging from 1 = "Mostly by natural causes" to 3 = "Mostly by human activity").We z-standardized all eight items and combined them into a single measure of personal pro-environmental motivation (*Cronbachs* α = .80), henceforth called personal motivation index (PMI).

Items measuring *collective pro-environmental motivation* refer to the salient ingroup (municipality, national, or EU). Collective pro-environmental motivation includes two items on perceived injunctive ingroup norms to save energy and to support the energy transition (example item: 'Many people in [my municipality, the country I live in, the EU] would support it if I used less energy, e.g., using public transport instead of a personal car, turning off lights when leaving the room, using technical appliances which help to save energy.'), two items on perceived descriptive ingroup norms to save energy and to support the energy transition (example item: 'A growing number of people in [my municipality, the country I live in, the EU] try to save energy, e.g., using public transport instead of a personal car, turning off lights when leaving the room, using technical appliances which help to save energy.'), and a single item on collective efficacy beliefs to support the energy transition ('We as people in [my municipality, the country I live in, the EU] can act together to achieve the energy transition.'). We z-standardized all items and averaged them into a single measure of collective pro-environmental motivation (*Cronbachs* α = .79), henceforth called collective motivation index (CMI). Finally, *social identification*, i.e. identification with the salient ingroup, was assessed with one item ('How much do you see yourself as a citizen of [your municipality, the country you live in, Europe]?', ranging from 1 = "not at all" to 5 = "very much"). This variable will henceforth be called *ID*.

Table II: Summary statistics of the respondent specific variables

Variable	Description	N	Mean	St. Dev.	Min	Max
PMI	Personal pro-environmental motivation index	18,037	0.000	0.643	−2.789	1.171
CMI	Collective pro-environmental motivation index	18,037	0.000	0.763	−2.563	1.482
ID	How much do you see yourself as a citizen of [your municipality, the country you live in, Europe]?	18,037	3.372	1.019	1	5
Acceptance	I would accept energy policies that protect the environment even when these induce higher costs (e.g., policies that increase the prices of fossil fuels).	18,037	3.298	1.130	1	5

The choice experiment. The ECHOES survey incorporated a discrete choice experiment (DCE) to examine preferences for community renewable energy (CRE) projects. A DCE is a research method used to study preferences of individuals. It is a type of stated preference study, which is used to measure how individuals would choose among different options. The method involves presenting respondents with a series of hypothetical choices between two or more options, where each option is defined by a set of attributes. The respondents are asked to indicate which option they would choose in each scenario.

Within the ECHOES' DCE, the respondents were presented with two hypothetical investment opportunities in eight different scenarios. In each scenario, respondents could choose to invest in a wind park or solar farm, with the investment levels, holding time and other attributes of the options varying between scenarios. A third 'opt-out' option was also provided in each scenario, allowing respondents not to invest. The order of the scenarios was randomized, and the survey included three blocks of eight scenarios for a total of 24 choice scenarios. An example choice card is depicted in Figure 1. The experimental design uses the D-efficiency criteria with Bayesian priors for creating choice sets. More information about the statistical design of the DCE can be found in [48].

Figure 1: Example choice card (Source: [46])

The levels of the holding periods varying between 5, 10 and 15 years. To calculate the profit we use the profit rate (0%, 5%, 10%, 20% or 50%) and the investment level which were randomly assigned. The investment levels -- €100, €500, €1000, €2000, or €5000 --, were not varied between the scenarios in order to simplify the choice tasks for the respondents. In Table III we describe all attributes and list their levels. Further, the survey included a treatment that told respondents that a local government, national government, or EU official had endorsed the investment opportunities. Each treatment was shown to one-quarter of the respondents in each country, with the remaining respondents seeing only a briefing explaining the investment opportunities.

Table III: Attribute levels and description

Attribute	Description	Levels
Profit rate	The percent of money you get on top of your initial investment.	0%, 5%, 10%, 20%, 50%
Holding Period	The number of years until you get your money back, including any profits.	5, 10, 15 years
Visibility	If the proposed wind or solar park is visible from your home.	visible or not visible
Administrator	The group that handles your investment and is in charge of building and running the power plant.	community organization, utility company or government entity

Econometric model: Empirical model based on random utility theory. Our model assumes that people maximize utility over time [49]. Utility in a broad sense, depends on individual-level factors, both tangible economic variables, such as the amount and timing of monetary payoffs, and personal behavior of self-efficacy beliefs. It further includes variables that capture collective cognition and motivation relevant to the decision-making situation. Specifically, utility is a function of observable characteristics of the investment alternatives, in particular the profit rate, the project length, the investment volume, the visibility of the renewable energy project, and the administrator of the project, as specified in the choice

experiment. Moreover, the parameters of the utility function are modeled as functions of observed individual and collective motivations of the respondents. The main aim of the paper is to analyze how the respondents' preferences are shaped by these latter variables.

I_n denotes the investment, which is independent of the choice alternative j but varies with respondent n, with $I_n \in \{100,500,1000,2000,5000\}$ Euros. The profit rate is $\pi_j \in \{0,0.05,0.10,0.20,0.50\}$, and is one of the attributes changing with choice alternatives.

After the specified holding period for the choice alternative, $T_j \in \{5,10,15\}$ years, has passed, the project delivers the cash flow $I_n(1+\pi_j)$. The utility from cash flow and other characteristics of the renewable energy investment X_{nj} at the end of the investment period T_j is described by the following utility function

$$V_{nj} = \mathrm{e}^{-\delta_n T_j}\left(I_n(1+\pi_j)\right)^{\alpha}\left(\mathrm{e}^{X_{nj}}\right)^{\beta}, \tag{1}$$

with $\alpha > 0$, and where the β is a vector of parameters indicating the marginal utility of other investment-specific characteristics X_j. As these are categorical variables, they enter linearly in the log of utility. The utility derived from the investment accrues T_j periods into the future, whereas the decision is made at present. Thus utility is expressed as a present value, which is obtained by applying the subjective (annual) utility discount rate δ. Taking logs and adding an independently and identically distributed random component ε_{nj}, we obtain the model

$$U_{njp} = \alpha \ln\left(I_n(1+\pi_j)\right) + \beta X_{nj} - \delta_n T_j + \varepsilon_{nj}. \tag{2}$$

Applying the model to the data from the choice experiment allows us to identify the model parameters. We model the utility discount rate as a function of individual and collective motivation indicator variables, which we summarize in the variable Y_n. The utility discount rate becomes:

$$\delta_n = \delta_0 + \delta_1 Y_n. \tag{3}$$

366 The effects of the social and psychological variables Y_n on the utility discount rate δ_n
367 are empirically identified by the estimated parameters for the interaction between these
368 variables and the holding period T_n, leading to

369 $$U_{njp} = \alpha \ln(I_n(1+\pi_j)) + \beta X_j - \delta_0 T_j - \delta_1 T_j \times Y_n + \varepsilon_{nj}.$$

370 *(4)*

371 To facilitate interpretation, we convert the utility discount rate δ_n into a money discount
372 rate, dividing it by the estimated coefficient for log profit, α. We thus obtain the money discount
373 rate

374 $$\rho_n = \frac{\delta_0 + \delta_1 Y_n}{\alpha}.$$

375 *(5)*

376 In the choice experiment, respondents choose repeatedly between two hypothetical
377 investment alternatives. We assume that the alternatives are mutually exclusive and the
378 respondent chooses either one of the two investment alternatives $j \in \{1,2\}$ or chooses not to
379 invest (opt out) $j = 0$.
380 In this setting, the parameters from this utility function can be estimated using a conditional
381 logit model. Assuming that ε_{nj} is Extreme Value Type I (Gumbel) distributed, we obtain the
382 logit probability

383 $$Pr(y_{nj} = i) = \frac{\exp(U_{ni})}{\sum_{j=1}^{J} \exp(U_{nj})}$$

384 *(6)*

385 As only differences in utility matter, the model can only be identified if the error
386 variance is normalized. The normalization implies that the estimated parameters are confounded
387 with the scale of the error variance so that the parameters have arbitrary values which cannot
388 be directly interpreted. However, by dividing the subjective utility discount rate by the
389 coefficient of the log profit α, the scale parameters drop out and we can interpret money
390 discount in units of % of profit per year. We are particularly interested in the subjective money

discount rate, ρ_n, which has been identified to be a key variable in decision-making related to climate change, as pointed out in the introduction

Results

In Models 1-5 (Table IV) we estimate Conditional Logit models using the DCE data. The dependent variable is the choice made by the respondents. The models include alternative-specific constants (*ASC_A* and *ASC_B*), which show the preferences for investment options A and B (i.e. respondent decides to invest in the energy project) over the opt-out alternative (i.e. respondent decides not to invest in the energy project). We also entered alternative-specific variables (Profit, Holding period, Visible installation, Community admin, Utility admin) and respondent-specific variables in the analysis (personal motivation index, collective motivation index, ID, group assignment: municipality, country, EU). We are in particular interested in the ratio of coefficients of the variable *Holding period* and *ln(Profit)* which we can interpret as the money discount rate, i.e. one of our central outcomes. Specifically, we aim to examine the impact of respondent-specific variables on the money discount rate, by analyzing interaction effects between the variable Holding period and the respondent-specific variables (personal motivation index, collective motivation index, ID, group assignment). For testing our hypotheses, we included the two-way interaction term of Holding period and personal motivation index in Model 1 (H1a), the two-way interaction term of Holding period and collective motivation index in Model 2 (H1b), as well as all two-way and three-way interaction terms of Holding period, collective motivation index and ingroup identification (ID) in Model 4 (H3). For exploring if collective pro-environmental motivation uniquely predicts the money discount rate, we included personal motivation index, collective motivation index and their two-way interaction terms with Holding period in Model 3.

Table IV: Results of the Conditional Logit models

	Model 1	Model 2	Model 3	Model 4	Model 5
ASC_A	-0.275^{***}	-0.279^{***}	-0.271^{***}	-0.279^{***}	-0.277^{***}

	Model 1	Model 2	Model 3	Model 4	Model 5
	(0.021)	(0.021)	(0.021)	(0.021)	(0.024)
ASC_B	-0.146^{***}	-0.150^{***}	-0.142^{***}	-0.150^{***}	-0.145^{***}
	(0.021)	(0.021)	(0.021)	(0.021)	(0.024)
ln(Profit)	4.720^{***}	4.714^{***}	4.725^{***}	4.715^{***}	4.701^{***}
	(0.037)	(0.037)	(0.037)	(0.037)	(0.042)
Holding period	0.095^{***}	0.094^{***}	0.095^{***}	0.104^{***}	0.107^{***}
	(0.001)	(0.001)	(0.001)	(0.004)	(0.008)
Visible installation	-0.021^{**}	-0.020^{**}	-0.022^{**}	-0.020^{**}	-0.026^{**}
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Community admin	0.051^{***}	0.052^{***}	0.051^{***}	0.051^{***}	0.055^{***}
	(0.010)	(0.010)	(0.011)	(0.010)	(0.012)
Utility admin	-0.122^{***}	-0.122^{***}	-0.122^{***}	-0.122^{***}	-0.116^{***}
	(0.010)	(0.010)	(0.010)	(0.010)	(0.012)
Hold*PMI	-0.043^{***}		-0.030^{***}		
	(0.002)		(0.002)		
Hold*CMI		-0.033^{***}	-0.018^{***}	-0.019^{***}	−0.013
		(0.002)	(0.002)	(0.005)	(0.009)
Hold*ID				-0.003^{**}	-0.004^{*}
				(0.001)	(0.002)
Hold*CMI*ID				-0.004^{**}	-0.005^{*}
				(0.001)	(0.003)
Hold*Municipal					−0.003
					(0.011)
Hold*CMI*Municipal					0.005
					(0.013)
Hold*ID*Municipal					0.002
					(0.003)
Hold*CMI*ID*Municipal					−0.001
					(0.004)
Hold*Country					−0.004
					(0.011)
Hold*CMI*Country					−0.018
					(0.013)

	Model 1	Model 2	Model 3	Model 4	Model 5
Hold*ID*Country					0.002
					(0.003)
Hold*CMI*ID*Country					0.005
					(0.004)
No Observations	144088	144088	144088	144088	108248
No Respondents	18037	18037	18037	18037	13552
Log Likelihood (Null)	−158296.84	−158296.84	−158296.84	−158296.84	−118922.58
Log Likelihood (Converged)	−137453.59	−137676.74	−137225.52	−137645.03	−103438.07

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$; Robust standard errors in parantheses

Probability to invest in energy project. First, we analyzed respondents' choices to invest or not invest in the proposed energy project. We observe a consistent preference for the opt-out alternative over an investment in the project A and a consistent preference for the opt-out alternative over an investment in the project B, *ceteris paribus*, evidenced by the significant negative regression coefficients for the variables *ASC_A* and *ASC_B* (Models 1-5). Overall, 27% of the choices were project A, 30% project B and 43% opt-out.. We also find that higher profit rates, non-visible installation (vs. visible installation) and community-based administration (vs. administration by utility company or public authority) of the energy site increased probability to investment in the energy project. These results are in line with previous findings on private investments in renewable energy projects [48].

(Money) Discount rate. From the coefficients of the variable *Holding period* and ln(Profit) in Models 1-5, we can directly derive the money discount rates. We expect that the discount rate is negatively associated with personal pro-environmental motivation (H1a) and collective pro-environmental motivation (H2a). The results of Models 1 and 2 support our assumptions. Specifically, we find a negative interaction effect of Holding period and personal motivation index (coefficient of *Hold*PMI*) in Model 1, indicating that higher levels of personal pro-environmental motivation are associated with a lower money discount rate (see Figure 2a).

The ratio of the coefficient of *Hold*PMI* and the coefficient of *ln(Profit)* describes the impact of an increase in the personal motivation index by one unit on the money discount rate. Given that the mean value of the personal motivation index is zero, the mean money discount rate across all respondents is 2.01% per year. In other words: €100 in one year is equivalent to €98.03 today ($€100 / (1 + 0.0201) = €98.03$). Further, increasing the personal motivation index by one unit decreases the mean money discount rate by 0.91%. Similarly, results also reveal a negative interaction effect of Holding period and collective motivation index in Model 2 (coefficient of *Hold*CMI*), showing that a stronger collective pro-environmental motivation is related to a lower money discount rate (see Figure 2b). The mean money discount rate here is 1.99% and decreases by 0.7% with an increase of the collective motivation index by one unit.

Figure 2a: Money discount rate and personal motivation index. Figure 2b: Money discount rate and collective motivation index

Next, we explored if the negative association between collective pro-environmental motivation and the money discount rate will remain stable after controlling for the effects of personal pro-environmental motivation. Results of Model 3 indicate that including the interaction effect of personal motivation index and Holding period (*Hold*PMI*) did not change the interaction effect of collective motivation index and Holding period (see Figure 3). Put differently, the negative relationship between collective pro-environmental motivation and the money discount rate remained robust after controlling for personal pro-environmental motivation. The results of Models 2 and 3 support our assumption that a stronger collective pro-environmental motivation is associated with a lower money discount rate. Building on the Social Identity Approach, we expect that the negative relationship between collective pro-environmental motivation and the money discount rate is stronger for participants who are highly identified with their group compared to low identifiers (H3a). The results of Model 4

support this assumption, revealing a statistically significant three-way interaction effect of Holding period, collective motivation index and ID (coefficient of *Hold*CMI*ID*). Inspection of the simple slopes (see Figure 4) showed that the negative association between collective pro-environmental motivation and the money discount rate was stronger for high identifiers (+1SD) than for respondents with low levels of ID (-1SD). Specifically, high identifiers exhibited a lower money discount rate compared to low identifiers when collective pro-environmental motivation was high. However, we found no difference in money discount rate between high and low identifiers for low levels of collective pro-environmental motivation. Finally, we also tested if the negative correlation between money discount rate and collective pro-environmental motivation changed for different salient ingroups (municipality, country, EU). Results of Model 5 showed no significant interaction effects of Holding period, collective motivation index and the dummy variables for type of salient identity (coefficients of *Hold*CMI*Municipal* and Hold*CMI*Country). This suggests that the negative relationship between collective motivation and money discount rate can be generalized across different forms of collectives.

Figure 3: Money discount rate, personal motivation and collective motivation index

Figure 4 Money discount rate, collective motivation index and group identification

Acceptance of green energy policies. Table V presents the results of a linear mixed model to investigate the relationships between policy acceptance, our second outcome measure, and the respondent-specific variables. The fixed effects in this model are represented by the coefficients of the independent variables personal motivation index, collective motivation index, and ID, as well as the interaction term of collective motivation index and ID. These coefficients represent the average effect of each variable on policy acceptance across all groups. The random effect in this model is represented by the *Survey country* variable. This variable

485 accounts for the fact that the data was collected from multiple groups (countries) and that the
486 variation within each group may be different from the variation across groups. The inclusion of
487 random effects in this model helps to account for the non-independence of observations within
488 groups and leads to more accurate estimates of the fixed effects of our independent variables.
489 We expected that policy acceptance is positively associated with personal pro-environmental
490 motivation (H1b) and collective pro-environmental motivation (H2b). We also expect that the
491 correlation between policy acceptance and collective motivation is stronger for high identifiers
492 compared to low identifiers (H3b). In line with H1b and H2b, the results of Model 6 (Table V)
493 indicate significant positive relationships between personal motivation index and acceptance of
494 green energy policies (coefficient of *PMI*) as well as between collective motivation index and
495 policy acceptance (coefficient of *CMI*). Although the correlation between personal motivation
496 index and policy acceptance is stronger, collective pro-environmental motivation can uniquely
497 add to the explanation of policy acceptance. Furthermore, we found a significant interaction
498 effect of collective motivation index and ID (coefficient of *CMI*ID*). Inspection of the simple
499 effects (see Figure 5) revealed that the correlation between collective motivation index and
500 policy acceptance is stronger when ID is high (+1SD) than for low levels of ID (-1SD). Results
501 of Model 6 thus support H3b.
502

Table V: Results of the Linear Mixed Model

	Model 6
(Intercept)	3.29^{***}
	(0.03)
PMI	0.79^{***}
	(0.02)
CMI	0.13^{***}
	(0.03)
ID	0.00
	(0.01)
CMI*ID	0.04^{***}
	(0.01)
AIC	48136.49
BIC	48230.10
Log Likelihood	−24056.25
Num. obs.	18037
Num. groups: Survey country	31

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 5: Policy acceptance, collective motivation index and group identification

Discussion

Given the urgency of the ecological transformation of whole societies, it is important to determine when and why citizens are ready to support systemic changes by accepting green policies and by investing their money in green businesses. The collective nature of effectively coping with large-scale environmental crises suggests that such support cannot be fully explained as a personal decision people make on the ground of their perceived personal costs, benefits, and capabilities. Instead, support for a green transformation might be better understood as an individual's expression of a *collective* action. That is, people support – personally costly – systemic changes towards ecological sustainability when they define themselves as a member of a collective that has collectively shared pro-environmental norms and goals and appears to be agentic in initiating collective action and effectively contributing to fighting environmental

crises. The current research supports this novel look at individuals' pro-environmental action: Collective motivation to protect the environment, indicated by people's perception of pro-environmental collective norms and collective efficacy, predicted both people's acceptance of green energy policies and lower discounting of future gains in hypothetical green energy investment decisions. While personal motivation (sense of personal obligation to protect the environment and personal pro-environmental identity) predicted these pro-environmental behaviors as well, the effects of collective motivation remained present when controlling for the effect of personal motivation. That is, collective motivation predicted support of the transformation independent of personal motivation. At the same time, controlling for personal motivation effects reduced the effects of collective motivation. This suggests, that part of the collective motivation effect could be mediated via people's personal sense of pro-environmental obligation and identity. In other words, perceived collective norms and efficacy might affect people's pro-environmental support behavior through changing the personal attitudes that then drive pro-environmental action.

As a further indication that the effects of norms and collective efficacy are also truly collective, we found that the effects were stronger in people who indicated higher identification with their salient ingroup. Obviously, it needs identified group members to make collective motivation factors work. Groups may not just have the power and magnitude to bring about significant pro-environmental change through societal transformation but they also provide identified members with a sense of agency in the face of collective problems causing personal helplessness, and they validate their actions as being appropriate. This is why, in our study across 31 different European countries, not just very large and highly powerful collective identities, such as "EU Citizens", had the observed motivating effects, but also smaller groups, such as the people in one's own country or municipality. Obviously, just thinking about the self in terms of some collective strengthens people's motivation to support pro-environmental systemic change.

Economic analysis usually takes preferences as given. This is true in particular for the discount rate, which is often assumed to be a constant, independent of time and circumstances also in the analysis of climate change mitigation policies [50]. Our study provides evidence that "personal circumstances" affect the discount rate. Specifically, personal and collective pro-environmental motivations influenced the discount rate people applied to renewable energy investment decisions in a choice experiment. Our study thus may help to inform the analysis of climate policies and renewable energy transition with endogenously changing preferences [51].

To increase investments into renewable energy projects and other environmental projects, policy makers can initiate marketing campaigns that aim to increase collective and individual motivations and strengthen collective experiences. Through this channel, the average social discount rate may reduce, facilitating the willingness to invest.

Conclusion

Pursuing rapid societal transformation towards ecological sustainability requires citizens' support. Obviously, environmentalism has definitely entered the stage where it is no longer sufficient to consider private consumption and lifestyle behavior as the individuals' contribution for saving the environment. Instead, now this is about supporting systemic, collective changes. This further illustrates that pro-environmental action is basically collective in nature and is motivated on the ground of collective cognition. The present study provides evidence for the crucial role of collective motivation in explaining individuals' support of an ecological transformation of societies, although the correlational nature of our data requires conceptual replications in experimental or longitudinal studies to provide clear causal evidence. On the more methodological side, our study shows that insights from psychology can meaningfully contribute to our understanding of economic decision-making, thus opening up a new perspective for fruitful interdisciplinary collaboration.

References

[1] IPCC. Climate change 2022: Impacts, adaptation and vulnerability : summary for policymakers. Geneva: IPCC 2022 Feb 27.

[2] Bamberg S, Möser G. Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. Journal of Environmental Psychology 2007; 27(1): 14–25 [https://doi.org/10.1016/j.jenvp.2006.12.002]

[3] Hamann K, Masson T. Kollektives nachhaltiges Handeln und Psychologie. In: Genkova P, editor. Handbuch Globale Kompetenz: Grundlagen – Herausforderungen – Krisen. Wiesbaden: Springer Fachmedien Wiesbaden; Imprint Springer 2020; 1–16.

[4] Lange F, Dewitte S. Measuring pro-environmental behavior: Review and recommendations. Journal of Environmental Psychology 2019; 63: 92–100 [https://doi.org/10.1016/j.jenvp.2019.04.009]

[5] Gordon HS. The Economic Theory of a Common-Property Resource: The Fishery. Journal of Political Economy 1954; 62(2): 124–42 [https://doi.org/10.1086/257497]

[6] Hardin G. The tragedy of the commons. Science 1968; 162(3859): 1243–8 [https://doi.org/10.1126/science.162.3859.1243][PMID: 17756331]

[7] Stavins RN. The Problem of the Commons: Still Unsettled after 100 Years. American Economic Review 2011; 101(1): 81–108 [https://doi.org/10.1257/aer.101.1.81]

[8] Bronnmann J, Stoeven MT, Quaas M, Asche F. Measuring Motivations for Choosing Ecolabeled Seafood: Environmental Concerns and Warm Glow. Land Economics 2021; 97(3): 641–54 [https://doi.org/10.3368/wple.97.3.101119-0147R]

[9] Quaas MF, Meya JN, Schenk H, Bos B, Drupp MA, Requate T. The social cost of contacts: Theory and evidence for the first wave of the COVID-19 pandemic in Germany. PLoS One 2021; 16(3): e0248288 [https://doi.org/10.1371/journal.pone.0248288][PMID: 33740007]

[10] Becker E, editor. Soziale Ökologie: Grundzüge einer Wissenschaft von den gesellschaftlichen Naturverhältnissen. Frankfurt: Campus Frankfurt / New York; 2006.

[11] Clayton S, Karazsia BT. Development and validation of a measure of climate change anxiety. Journal of Environmental Psychology 2020; 69: 101434 [https://doi.org/10.1016/j.jenvp.2020.101434]

[12] Salomon E, Preston JL, Tannenbaum MB. Climate change helplessness and the (de)moralization of individual energy behavior. J Exp Psychol Appl 2017; 23(1): 15–28 [https://doi.org/10.1037/xap0000105][PMID: 28165276]

[13] Reicher S, Spears R, Haslam SA. The Social Identity Approach in Social Psychology. In: Wetherell M, Mohanty C, Mohanty CT, editors. The SAGE handbook of identities. Online-Ausg. Los Angeles, Calif., London: SAGE 2010; 45–62.

[14] Turner JC. Rediscovering the social group: A self-categorization theory. Oxford: Basil Blackwell 1987.

[15] Fritsche I, Barth M, Jugert P, Masson T, Reese G. A social identity model of pro-environmental action (SIMPEA). Psychol Rev 2018; 125(2): 245–69 [https://doi.org/10.1037/rev0000090][PMID: 29265852]

[16] Lickel B, Hamilton DL, Wieczorkowska G, Lewis A, Sherman SJ, Uhles AN. Varieties of groups and the perception of group entitativity. J Pers Soc Psychol 2000;

78(2): 223–46
[https://doi.org/10.1037//0022-3514.78.2.223][PMID: 10707331]

[17] Masson T, Fritsche I. We need climate change mitigation and climate change mitigation needs the 'We': a state-of-the-art review of social identity effects motivating climate change action. Current Opinion in Behavioral Sciences 2021; 42: 89–96 [https://doi.org/10.1016/j.cobeha.2021.04.006]

[18] Fritsche I, Masson T. Collective climate action: When do people turn into collective environmental agents? Curr Opin Psychol 2021; 42: 114–9 [https://doi.org/10.1016/j.copsyc.2021.05.001][PMID: 34130199]

[19] Fielding KS, Hornsey MJ. A Social Identity Analysis of Climate Change and Environmental Attitudes and Behaviors: Insights and Opportunities. Front Psychol 2016; 7: 121 [https://doi.org/10.3389/fpsyg.2016.00121][PMID: 26903924]

[20] Bamberg S, Rees JH, Schulte M. Environmental protection through societal change. In: Clayton SD, Manning C, editors. Psychology and climate change: Human perceptions, impacts, and responses. London, San Diego, Cambridge, Oxford: Academic Press 2018; 185–213.

[21] Requate T. Green tradable certificates versus feed-in tariffs in the promotion of renewable energy shares. Environ Econ Policy Stud 2015; 17(2): 211–39 [https://doi.org/10.1007/s10018-014-0096-8]

[22] Lancker K, Quaas MF. Increasing marginal costs and the efficiency of differentiated feed-in tariffs. Energy Economics 2019; 83: 104–18 [https://doi.org/10.1016/j.eneco.2019.06.017]

[23] Barth M, Masson T, Fritsche I, Fielding KS, Smith JR. Collective responses to global challenges: The social psychology of pro-environmental action. Journal of Environmental Psychology 2021; 74: 101562.

[24] Schulte M, Bamberg S, Rees J, Rollin P. Social identity as a key concept for connecting transformative societal change with individual environmental activism. Journal of Environmental Psychology 2020; 72: 101525 [https://doi.org/10.1016/j.jenvp.2020.101525]

[25] Bliuc A-M, McGarty C, Thomas EF, Lala G, Berndsen M, Misajon R. Public division about climate change rooted in conflicting socio-political identities. Nature Clim Change 2015; 5(3): 226–9 [https://doi.org/10.1038/nclimate2507]

[26] Unsworth KL, Fielding KS. It's political: How the salience of one's political identity changes climate change beliefs and policy support. Global Environmental Change 2014; 27: 131–7 [https://doi.org/10.1016/j.gloenvcha.2014.05.002]

[27] Bamberg S, Rollin P, Schulte M. Local mobility culture as injunctive normative beliefs – A theoretical approach and a related measurement instrument. Journal of Environmental Psychology 2020; 71: 101465 [https://doi.org/10.1016/j.jenvp.2020.101465]

[28] Barth M, Jugert P, Fritsche I. Still underdetected – Social norms and collective efficacy predict the acceptance of electric vehicles in Germany. Transportation Research Part F: Traffic Psychology and Behaviour 2016; 37: 64–77 [https://doi.org/10.1016/j.trf.2015.11.011]

[29] Masson T, Jugert P, Fritsche I. Collective self-fulfilling prophecies: group identification biases perceptions of environmental group norms among high identifiers. Social Influence 2016; 11(3): 185–98 [https://doi.org/10.1080/15534510.2016.1216890]

667 [30] Masson T, Fritsche I. Adherence to climate change-related ingroup norms: Do
668 dimensions of group identification matter? Eur. J. Soc. Psychol. 2014; 44(5): 455–65
669 [https://doi.org/10.1002/ejsp.2036]
670 [31] Terry DJ, Hogg MA, White KM. The theory of planned behaviour: self-identity, social
671 identity and group norms. Br J Soc Psychol 1999; 38 (Pt 3): 225–44
672 [https://doi.org/10.1348/014466699164149][PMID: 10520477]
673 [32] Vesely S, Masson T, Chokrai P*, et al.* Climate change action as a project of identity:
674 Eight meta-analyses. Global Environmental Change 2021; 70: 102322
675 [https://doi.org/10.1016/j.gloenvcha.2021.102322]
676 [33] Hamann KRS, Reese G. My Influence on the World (of Others): Goal Efficacy Beliefs
677 and Efficacy Affect Predict Private, Public, and Activist Pro-environmental Behavior.
678 Journal of Social Issues 2020; 76(1): 35–53
679 [https://doi.org/10.1111/josi.12369]
680 [34] Hornsey MJ, Fielding KS. A cautionary note about messages of hope: Focusing on
681 progress in reducing carbon emissions weakens mitigation motivation. Global
682 Environmental Change 2016; 39: 26–34
683 [https://doi.org/10.1016/j.gloenvcha.2016.04.003]
684 [35] Jugert P, Greenaway KH, Barth M, Büchner R, Eisentraut S, Fritsche I. Collective
685 efficacy increases pro-environmental intentions through increasing self-efficacy. Journal
686 of Environmental Psychology 2016; 48: 12–23
687 [https://doi.org/10.1016/j.jenvp.2016.08.003]
688 [36] Goedkoop F, Sloot D, Jans L, Dijkstra J, Flache A, Steg L. The Role of Community in
689 Understanding Involvement in Community Energy Initiatives. Front Psychol 2021; 12:
690 775752
691 [https://doi.org/10.3389/fpsyg.2021.775752][PMID: 35222148]
692 [37] Berneiser JM, Becker AC, Loy LS. Give Up Flights? Psychological Predictors of
693 Intentions and Policy Support to Reduce Air Travel. Front Psychol 2022; 13: 926639
694 [https://doi.org/10.3389/fpsyg.2022.926639][PMID: 35992431]
695 [38] Requate T. Dynamic incentives by environmental policy instruments—a survey.
696 Ecological Economics 2005; 54(2-3): 175–95
697 [https://doi.org/10.1016/j.ecolecon.2004.12.028]
698 [39] Voors MJ, Nillesen EEM, Verwimp P, Bulte EH, Lensink R, van Soest DP. Violent
699 Conflict and Behavior: A Field Experiment in Burundi. American Economic Review
700 2012; 102(2): 941–64
701 [https://doi.org/10.1257/aer.102.2.941]
702 [40] Matousek J, Havranek T, Irsova Z. Individual discount rates: a meta-analysis of
703 experimental evidence. Exp Econ 2022; 25(1): 318–58
704 [https://doi.org/10.1007/s10683-021-09716-9]
705 [41] Klöckner CA. A comprehensive model of the psychology of environmental
706 behaviour—A meta-analysis. Global Environmental Change 2013; 23(5): 1028–38
707 [https://doi.org/10.1016/j.gloenvcha.2013.05.014]
708 [42] Stern N. The Economics of Climate Change. Cambridge University Press 2014.
709 [43] Nordhaus WD. A Review of the Stern Review on the Economics of Climate Change.
710 Journal of Economic Literature 2007; 45(3): 686–702
711 [https://doi.org/10.1257/jel.45.3.686]
712 [44] Quaas MF, van Soest D, Baumgärtner S. Complementarity, impatience, and the
713 resilience of natural-resource-dependent economies. Journal of Environmental Economics
714 and Management 2013; 66(1): 15–32
715 [https://doi.org/10.1016/j.jeem.2013.02.001]

716 [45] Drupp MA, Freeman MC, Groom B, Nesje F. Discounting Disentangled. American
717 Economic Journal: Economic Policy 2018; 10(4): 109–34
718 [https://doi.org/10.1257/pol.20160240]
719 [46] Reichl J, Cohen J, Kollmann A*, et al.* International survey of the ECHOES project.
720 Zenodo 2019; 1.
721 [47] Psychology of sustainable development. Softcover reprint. New York, NY: Springer
722 Science + Business Media; 2012.
723 [48] Cohen JJ, Azarova V, Kollmann A, Reichl J. Preferences for community renewable
724 energy investments in Europe. Energy Economics 2021; 100: 105386
725 [https://doi.org/10.1016/j.eneco.2021.105386]
726 [49] McFadden D. Conditional logit analysis of qualitative choice behavior. In: Frontiers in
727 econometrics. New York [u.a.]: Academic Press, 1974 1974.
728 [50] Hänsel MC, Drupp MA, Johansson DJA*, et al.* Climate economics support for the UN
729 climate targets. Nature Clim Change 2020; 10(8): 781–9
730 [https://doi.org/10.1038/s41558-020-0833-x]
731 [51] Mattauch L, Hepburn C, Spuler F, Stern N. The economics of climate change with
732 endogenous preferences. Resource and Energy Economics 2022; 69: 101312
733 [https://doi.org/10.1016/j.reseneeco.2022.101312]
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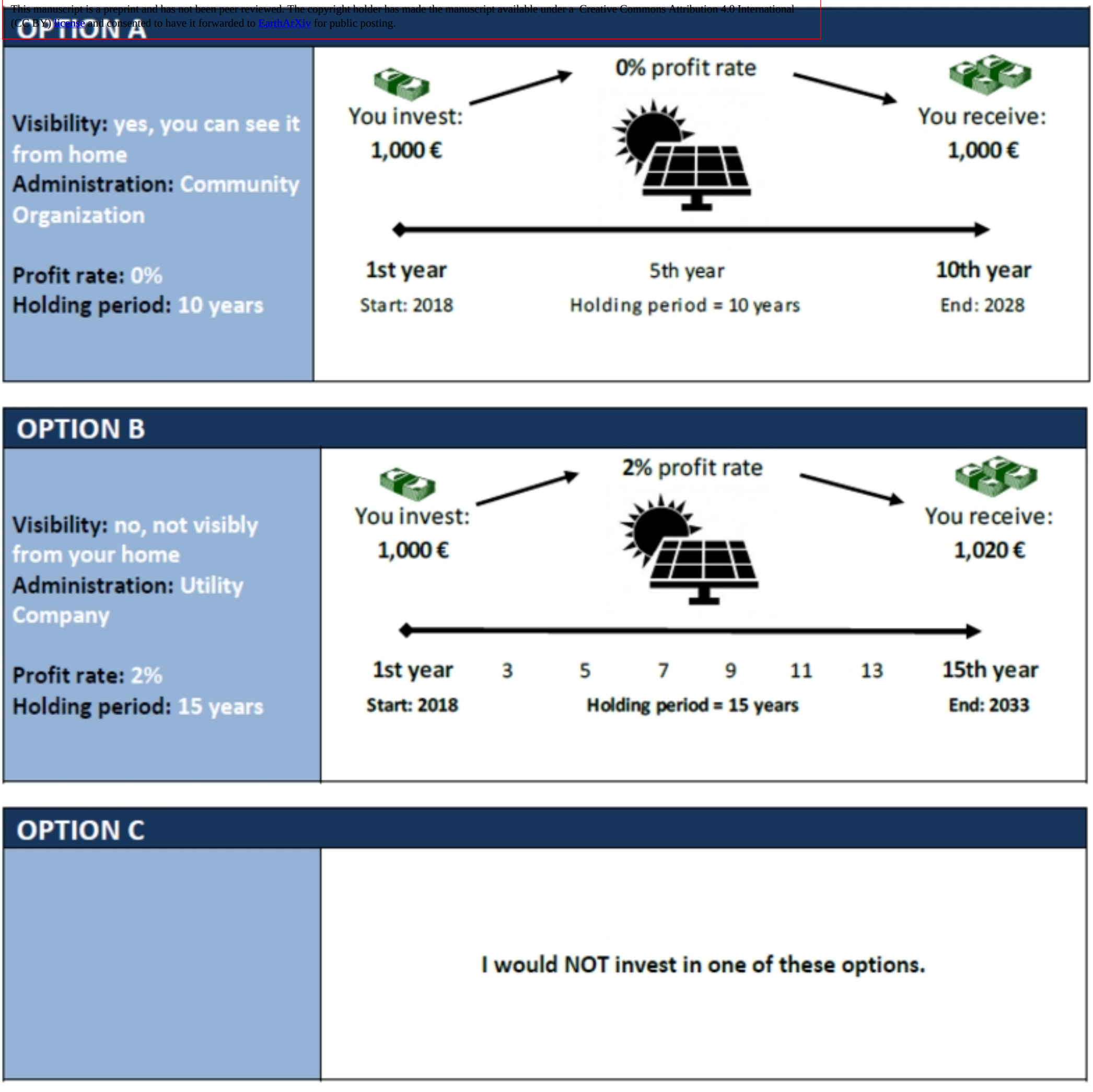
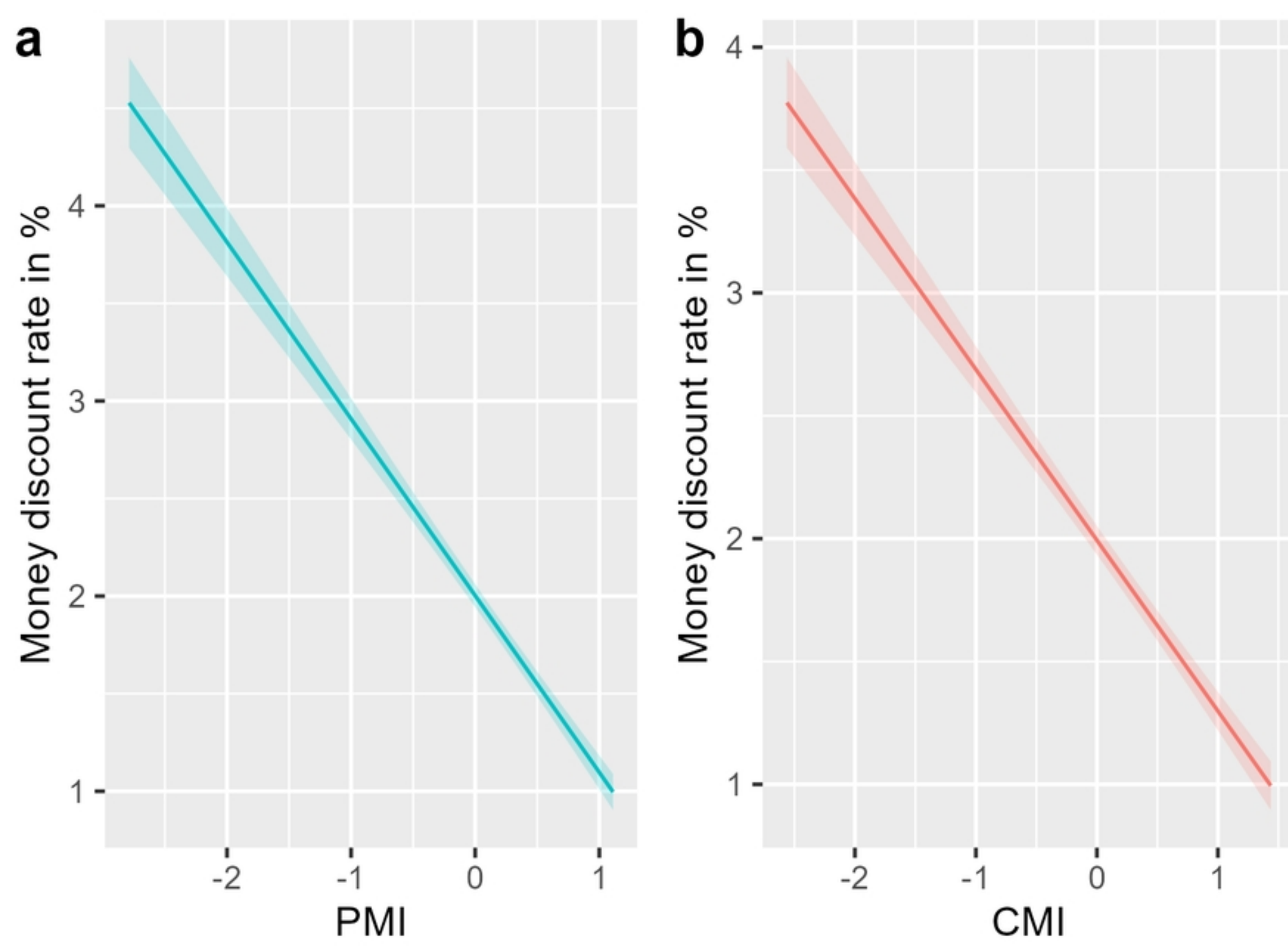


Figure_1


a
Money discount rate in %
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1
-2
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PMI
b
Money discount rate in %
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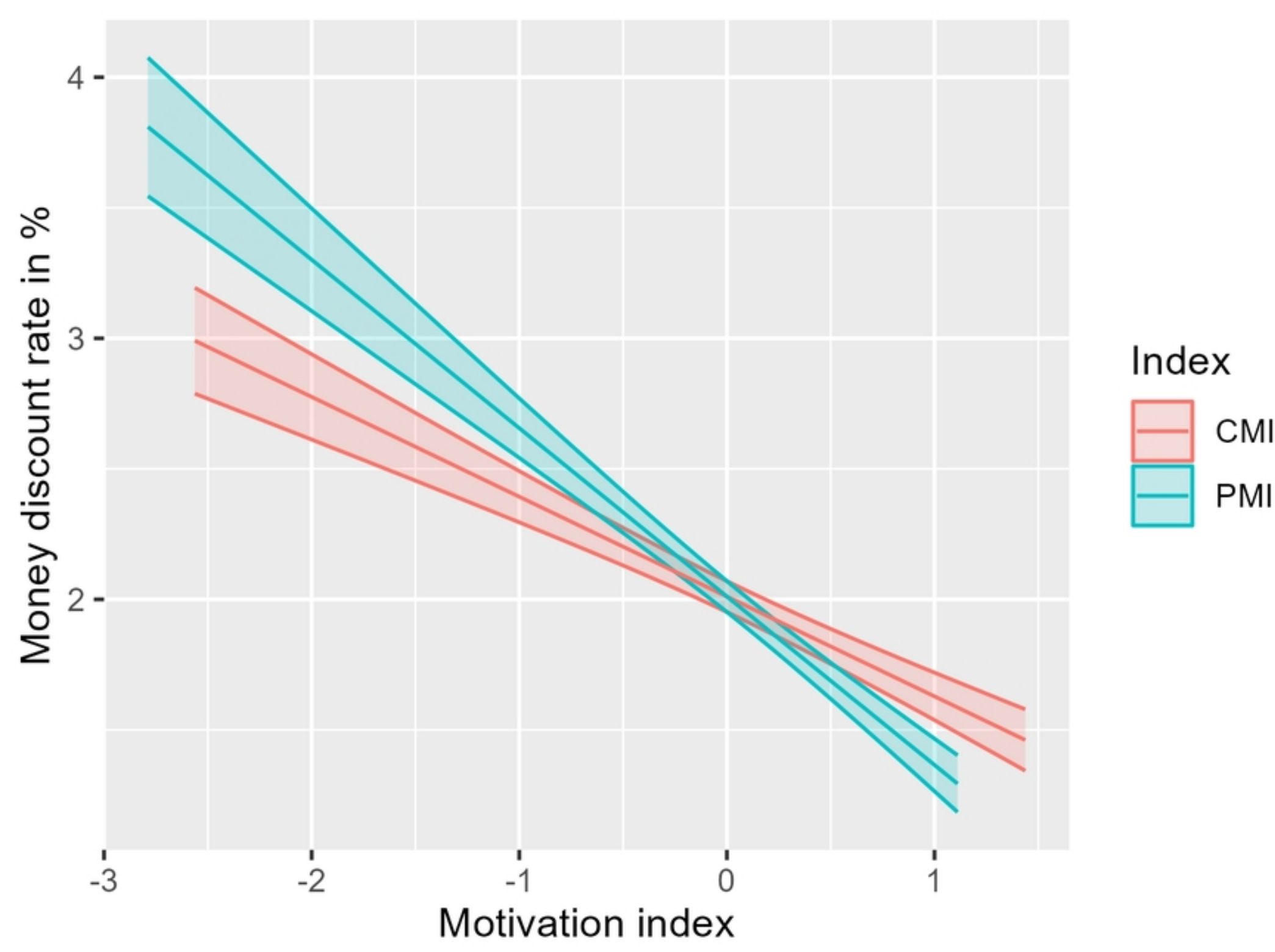
CMI

Figure_2


Money discount rate in %
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Motivation index
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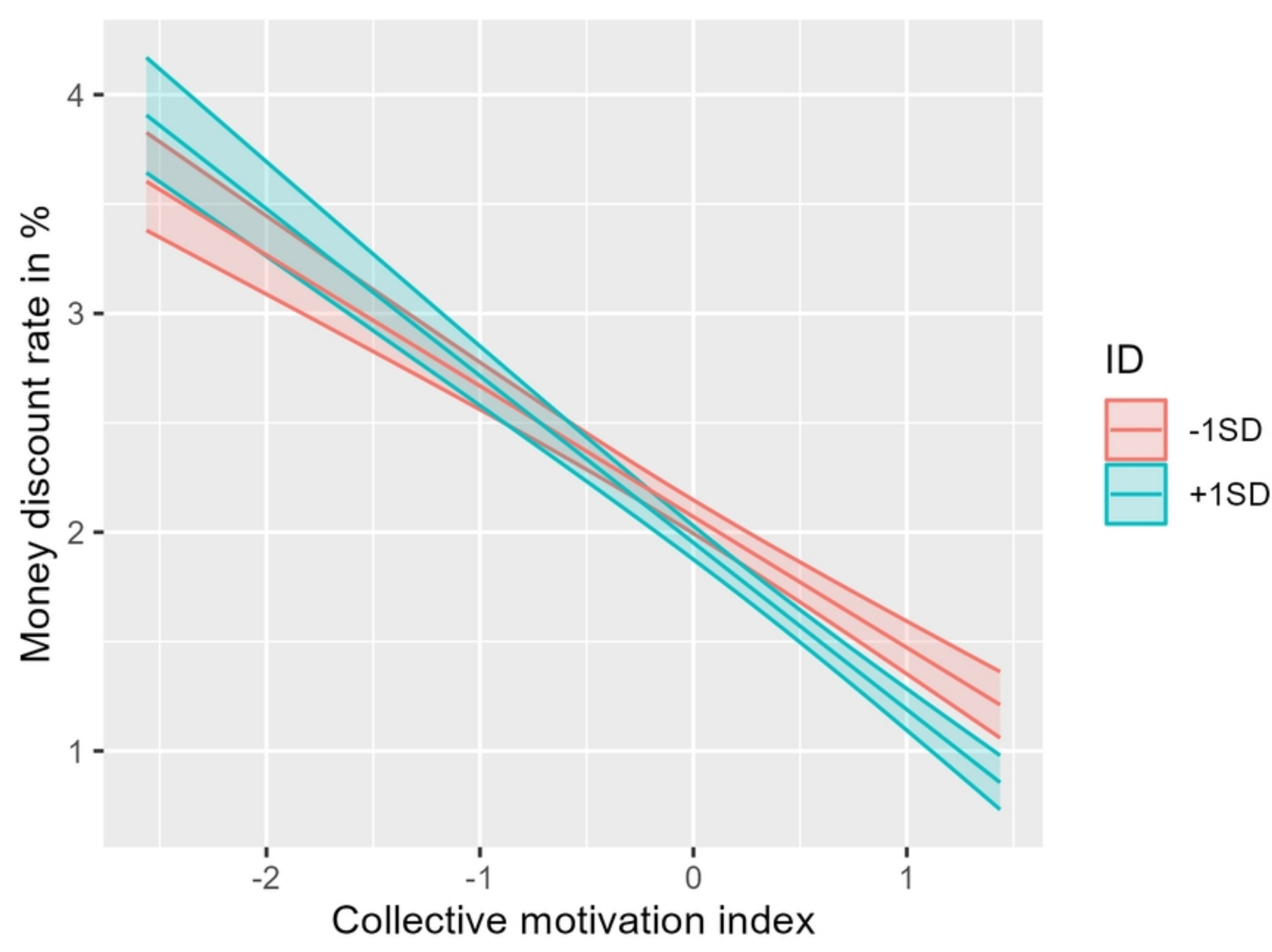
Figure_3


Money discount rate in %
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-2
-1
0
1
Collective motivation index
ID
-1SD
+1SD

Figure_4

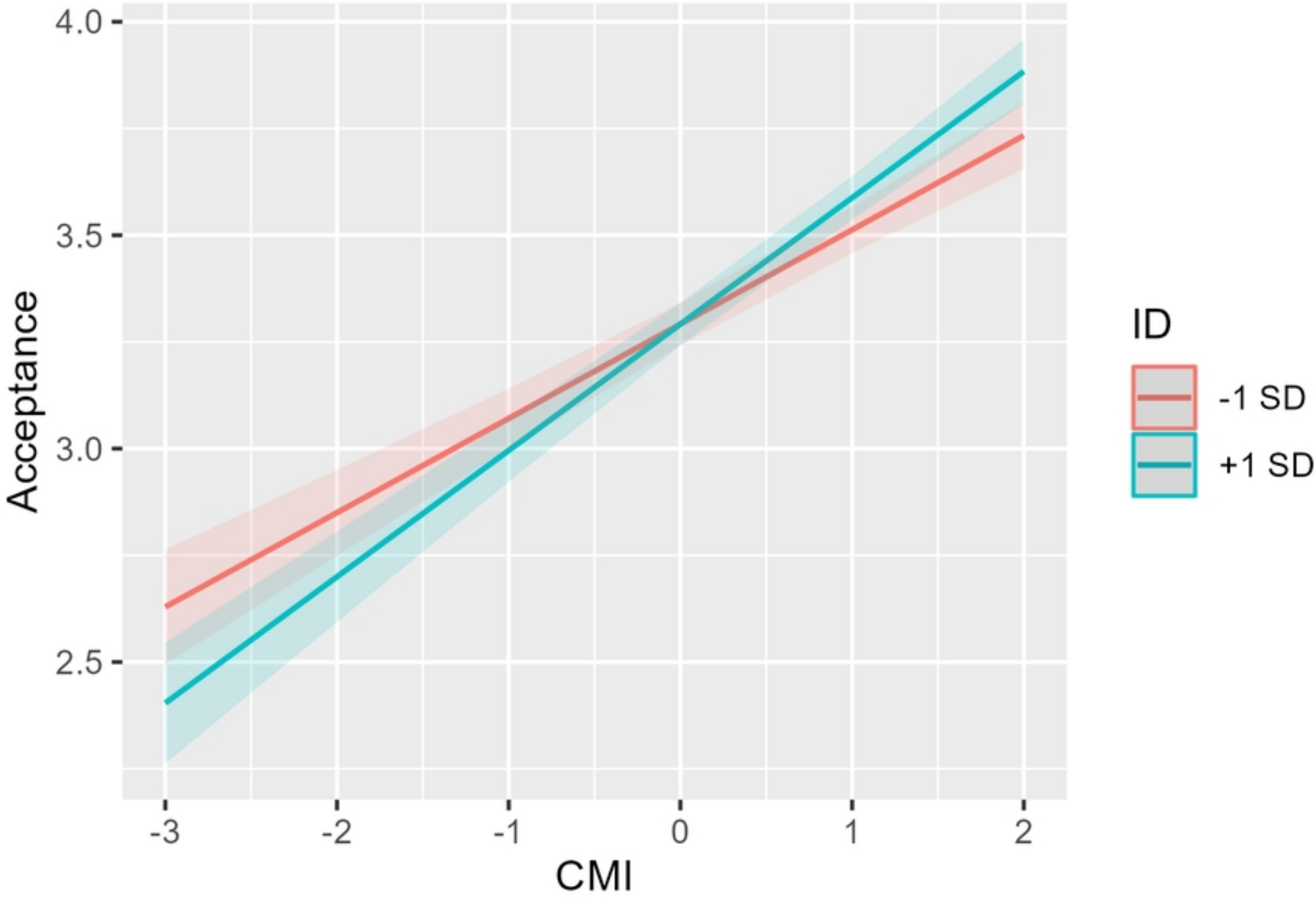

Figure_5