



Moral reasoning and climate change mitigation: The deontological reaction toward the market-based approach



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ABSTRACT

The research investigated the relation between the individual's deontological stance about environment and the attitude toward a market-based approach to climate change mitigation. We introduced people to the cap-and-trade program which is expected both to reduce the environmental risk and maximize economic benefits. Study 1 showed that the stronger the deontological mandate people held toward nature, the more likely they were to refuse the cap-and-trade mitigation program regardless of its effectiveness. In Study 2 and in Study 3, a similar win–win scenario was adopted to explore whether deontology and consequentialism consist of mutually exclusive orientations. Our results revealed that the deontological approach per se did not preclude the use of the cost–benefit analysis and that consequentialism moderated the relationship between deontology and the attitude toward the cap-and-trade program. Taken together, our findings have relevant practical implications for environmental politics and contribute to theoretical insights into moral reasoning.

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1. Introduction

Over the last decade, moral philosophy, psychology, and neighboring fields (Gardiner, 2010; Jamieson, 2010; Markowitz & Shariff, 2012; Singer, 2002) have attempted to frame climate change as a moral issue. The moral implications related to climate change fundamentally stem from the abuse of a common and scarce resource—the capacity of the atmosphere to absorb greenhouse gases (GHG)—by a group of people (i.e., developed countries) at the expense of others (i.e., developing countries). The fundamental ethical challenges in climate change concern not only its causes and consequences but also the distribution of the burdens to address it.

A current line of research in political philosophy and economics (Grasso, 2013; Montgomery, 1972; Singer, 2002) indicates that the goal of mitigation may be accomplished effectively by embracing a welfare-maximizing, consequentialist approach based on international systems of tradable emission rights (i.e., emission trading schemes). This approach posits that emission rights, namely the permission to authorize the release of a specified amount of GHG into the atmosphere, should be allocated in inverse proportion to

the marginal abatement costs of countries: the lower the cost the more the emission rights should be proportionally attributed. At the same time, Northern countries, typically with lower initial cutbacks due to their higher marginal abatement cost, should economically compensate Southern countries for their proportionally larger share of emission cutbacks entailed by their lower marginal abatement costs (Grasso, 2013; Montgomery, 1972; Singer, 2002). In relation to mitigation burdens, such a market-based approach would be effective, as environmental and economic analysis shows (that is, a so-called win–win scenario), and morally tenable as utilitarian moral philosophy suggests, thus aspiring to “the greatest good for the greatest number” (Bentham, 1781/1988). However, despite its efficacy, the emission trading mitigation scheme may run into important psychological constraints related to the perception of nature and moral taboos. In particular, it seems to ignore the *sacred value* (Baron & Spranca, 1997; Fiske & Tetlock, 1997) of environmental assets that are here substantially commodified.

The present contribution aims at exploring the psychological moral boundaries that a consequentialist approach to mitigation would face. In particular, we will conduct a set of experiments for analyzing the possible effects of the individual's moral orientations (namely, deontology and consequentialism) on the willingness to accept the cap and trade option. The purpose of this line of research is twofold: first, the examination of the moral reasoning with

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regard to mitigation could be useful in advancing psychological research on moral cognition due to the specificities of such a decisional scenario; second, adjusting the ethics of mitigation with the indications offered by cognitive psychology on moral processes is likely to lessen its controversy.

2. Deontological reasoning on (taboo) trade-offs

According to the normative approach, a compensatory relationship between the amount of money and any goods is always possible, even when the goods consist of moral values such as individual freedom, environmental protection, or human life (Bennis, Medin, & Bartels, 2010). Nevertheless, converging evidence from social psychology and moral cognition studies have shown that people may be extremely reluctant to engage in certain types of trade-offs (Fiske & Tetlock, 1997). Some values, such as those pertaining to human rights or natural resources, are treated as possessing infinite worth that cannot be compared to material values (Tetlock, Kristel, Elson, Green, & Lerner, 2000), especially by people with high deontological orientations (Tanner, Medin, & Iliev, 2008). These *sacred* (Fiske & Tetlock, 1997) or *protected values* (Baron & Spranca, 1997) are strictly related to deontological rules and moral obligations that require or prohibit certain actions despite their consequences (e.g., “the old-growth forests cannot be cut; therefore the forest has incommensurable economic value”).

The respect of these specific values is conceived of as a moral rule that works as a categorical imperative (Kant, 1785/1959) during reasoning and decision-making processes (Baron & Spranca, 1997). In these terms, choices about values such as nature are deontological because people decide whether or not to act according to moral obligations or prohibitions, regardless of the possible consequences of that action or omission (Baron & Spranca, 1997; Tanner et al., 2008). Hence, the sacralization of some values and a deontological orientation during moral reasoning are likely to intertwine (Tanner et al., 2008). People with high deontological orientation (Skitka, 2002) will reject material compensation for environmental assets because they are particularly prone to thinking about this type of trade-off as a taboo and moral outrage, seriously downgrading their social identity and their self-perception as moral beings (Fiske & Tetlock, 1997; Tetlock et al., 2000). Consistent with this idea, Tanner and colleagues (Tanner, 2009; Tanner et al., 2008) demonstrated that people with high deontological orientation are more likely to sacralize these type of values.

Related to deontology, recent research has shown the relationship between moralized values and a lack of concern for consequences (Baron & Spranca, 1997; Bartels & Medin, 2007; Tanner & Medin, 2004; Tanner et al., 2008). For example, Baron and Leshner (2000) suggested that when facing taboo trade-offs people are prone to incomplete thinking that does not consider all of the possible outcomes. Tanner (2009) also demonstrated the effects of *zero thresholds* and insensitivity to incentives (see also Kessler et al., 2010). Hence, people are inclined to protest trade-offs because they consider some values incommensurable and many actions simply impermissible no matter how great the benefits.

3. Deontological reasoning and market-based approach to mitigation

This strand of research traditionally focused on the trade-offs between sacred values and secular values. These trade-offs traditionally implied that economic advantages are related to a derogation of moral principles and therefore to a violation of rules (Hanselmann & Tanner, 2008; Tetlock, 2003; Tetlock et al., 2000).

For example, if we deforest in order to obtain money, we contravene the moral norm that requires respect for the environment.

However, beyond these decisional trade-offs, theoretical analysis has identified a variety of win–win scenarios in which both ethical concerns and material interests can be preserved (Nielsen, 2009). Therefore, in a win–win solution, the commodification of a moralized value will lead to material advantages but, at the same time, the material rewards will come along with respect for the moral rule. If the relationship between deontological orientation and sacred values has been broadly analyzed (e.g., Baron & Spranca, 1997; Tetlock et al., 2000), the literature has neglected the individual's deontological reaction when dealing with such a win–win scenario. The present study is therefore aimed at addressing this neglected issue.

As a case in point, the cap and trade scheme for climate change mitigation perfectly fits this definition of the win–win scenario. In fact, although it is market-based, it is likely to reduce the environmental risks by reducing GHG emissions in the atmosphere on one side and maximizing the economic benefits on the other side (Grasso, 2013). Indeed, the present study concentrates on exploring the response in front of such a proposal in relation to the individual's deontological orientation. In particular, we hypothesized that although the cap and trade program is morally tenable and does not pose a threat to the environment, it is likely to elicit a rejection from people that hold a deontological stance about the environment because of the commodification of natural assets. The understanding of a cap and trade scheme as a win–win solution, as well as the tuning of the consequent response, may require a deep cognitive analysis. As previous research on moral cognition and moral neuroscience has suggested (Bartels, 2008; Greene, Nystrom, Engell, Darley, & Cohen, 2004; Sunstein, 2005), deontology-consistent judgments would be intuitive, automatic, and based on a set of mental heuristics consisting of a match between decision options and moral rules. Regardless of the consequences, a reasoning which implies the comparison between sacred and secular values is perceived as indecent conduct from a deontological perspective and may lead to acts of moral cleansing (Tetlock, 2003; see also Hanselmann & Tanner, 2008). Under these conditions, people with a high deontological mode of thinking may be likely to protest the market-based option without initiating an analysis to differentiate a “true” from an “apparent” trade-off between money and moral value (Lichtenstein, Gregory, & Irwin, 2007).

More specifically, and in line with our hypothesis, the present research tested whether or not a high deontological standpoint on the environment would prevent people from accepting a market-based approach to natural resources, even when the exchange is advantageous from both an economic and an environmental point of view (e.g., a win–win scenario). Thus, in the specific case of a cap and trade scheme, we hypothesized that the greater the deontological stance, the more likely the case that people would be reluctant to support it. In fact, although this approach would lead to greater environmental and economic benefits, it is likely to be perceived as a moral outrage because of the projected monetary compensation for the release of GHG into the atmosphere, which can be regarded as the sacrilegious commodification of natural resources.

4. Overview

We tested our hypothesis across three studies. Study 1 explored whether an individual's deontological way of thinking was related to the attitude toward the cap and trade scheme for mitigation and specifically, to proposal derogation. Moreover, we investigated whether or not such an attitude was a result of insensitivity to consequences, which is considered a disregard for positive ultimate benefit.

Study 2 extended Study 1 by taking into account some potential moderating factors of the pattern that we hypothesized. Specifically, we investigated whether or not the anticipated interactive relationship between deontological orientation and the willingness to accept the market-based scheme may be moderated by the individual's orientation toward the cost–benefit analysis (i.e., consequentialism). In this second study, we moved beyond the classical dichotomy between consequentialism and deontology. More specifically, we hypothesized that people high in deontology, but who also embrace a consequentialist perspective, would be more supportive toward the option than people who totally refuse the consequentialist concerns.

Finally, in Study 3, we aimed at replicating and extending the results of the two previous studies exploring the interactive effects between individual's deontology and consequentialism with regard to the attitude toward the cap and trade scheme when the prospective consequences were described in positive or negative terms. Moreover, in this last study, the willingness to accept the market-based approach was assessed through different items and variables in order to increase the reliability of the measures.

5. Study 1

5.1. Methods

5.1.1. Participants

A total of 122 students at the University of Milano–Bicocca were recruited for this study, of which 42 were male and 80 were female, between the ages of 19 and 26 ($M = 20.81$; $SD = 1.50$). Sixty-one participants were students at the faculty of economics, 61 at the faculty of sociology. All participants were Italian citizens.

5.1.2. Materials and procedure

Participants were approached in the campus libraries and asked to participate in a study on social psychology. Those students who agreed to participate were given a questionnaire to fill out. In the first page of the questionnaire the instructions specified that participants had to fill out the questionnaire on perception of environment and climate change individually. The researcher monitored till the questionnaire was completed and returned.

After collecting the participants' demographic data (i.e., age, gender, and nationality), a four-item deontology scale was administered (Tanner et al., 2008; $\alpha = .71$). The original items developed by Tanner et al. (2008) were translated properly into Italian and then adapted to encompass environmental issues (e.g., “With regard to the environment, one should make decisions that are consistent with principles people have to follow”). Afterward, participants were asked to read a fictitious article about environmental concerns (see Appendix A). The piece described a proposal for the introduction of an experimental program aimed at reducing GHG emissions and was based on the allocation of emission rights to people. Hence, the scheme that was presented to participants was a simplified version of the cap-and-trade scheme for mitigation.

In the final part of the scenario, we illustrated the possible consequences of the experimental program. Thus, half of the sample was told that the anticipated consequences are extremely positive and that the program would be extremely effective at reducing GHG emissions and preventing future damages for the environment and people's health (positive consequences); the other half was told that the program would be totally ineffective at reducing GHG emissions and unlikely to prevent future damages (negative consequences). It is worth noting that the positive consequences condition represents the actual market-based proposal for mitigation. Participants were randomly assigned to either positive or negative conditions.

We then assessed the participants' attitudes toward the program (i.e., “Are you in favor of introducing the program described in the scenario?”). Finally, a manipulation check was added to verify that participants properly perceived the consequence manipulation (i.e., “Independently from your opinion, how effective is the program at reducing risks for people and the environment?”). Participants provided all their responses on a 7-point scale, ranging from 1 (*absolutely not*) to 7 (*absolutely yes*). At the end of the questionnaire, participants were debriefed, thanked and released.

5.2. Results and discussion

First, to verify that our manipulation was understood effectively, a *t*-test on consequence evaluation (*manipulation check*) was performed to compare the two experimental groups (consequences: positive vs. negative). The analysis revealed that program consequences were estimated to be more effective in the positive condition ($M = 3.49$, $SD = 1.58$) than in the negative condition ($M = 2.70$, $SD = 1.60$), $t(118) = 2.72$, $p = .008$, $d = .50$. Thus, we can conclude that our experimental manipulation was successful and that participants perceived information about the outcome accordingly.

Preliminary analyses on possible effects of participants' personal characteristics revealed that women ($M = 3.01$, $SD = 1.63$) were less willing to support the program than men ($M = 3.83$, $SD = 1.72$), $t(120) = 2.58$, $p = .01$. However the difference between women ($M = 4.75$, $SD = 1.10$) and men ($M = 4.42$, $SD = 1.08$) on deontological orientation was not significant, $t(120) = 1.60$, $p = .11$. Moreover, the analyses yielded a difference on the attitude toward the program between university faculties, $F(1, 119) = 3.72$, $p = .06$, $\eta_p^2 = .03$, with economists ($M = 3.59$, $SD = 1.81$) who were more supportive than sociologists ($M = 3.00$, $SD = 1.54$). This difference was not found on the measure of deontology, $F(1, 119) = .03$, $p = .87$. Finally, participants' age proved to be positively related to deontology ($r = .26$, $p = .004$) but unrelated to the attitude toward the program ($r = -.10$, $p = .27$).

Crucially, the interaction effect between the participants' modes of moral reasoning (i.e., deontology) and the consequence on the attitude toward the program was explored using a hierarchical multiple regression. Before computation, the index of deontology was centered on its mean ($M = 4.63$, $SD = 1.10$). Then, in the first step of the regression, we entered deontology as a continuous variable and consequences as a dummy variable. In the second step, the product terms representing deontology \times consequences were introduced. Table 1 summarizes the results of the regression analysis.

As revealed by the analysis, although the anticipated consequences did not affect attitudes toward the program ($\beta = .01$, $p = .88$), the deontological mandate had a significant and negative relation with attitude ($\beta = -.38$, $p = .03$).

More interestingly, the analyses revealed a significant deontology \times consequences interaction ($\beta = -.25$, $p = .03$). The slope analysis plotted in Fig. 1 showed that, when the individual's

Table 1

Multiple regression analysis to test the interaction between deontology and consequences (i.e., experimental condition). Dependent variable: attitude toward the cap-and-trade program. Study1.

Predictors	R ²	F (Sig)	β	β	<i>t</i>	<i>p</i>
First step	.18	10.63 (.001)				
Deontology			-.65	-.42	-5.02	.00
Consequences			.04	.01	.14	.88
Second step	.21	10.22 (.001)				
Deontology			-.38	-.25	-2.16	.03
Consequences			.04	.01	.15	.88
Deontology \times consequences			-.55	-.25	-2.15	.03

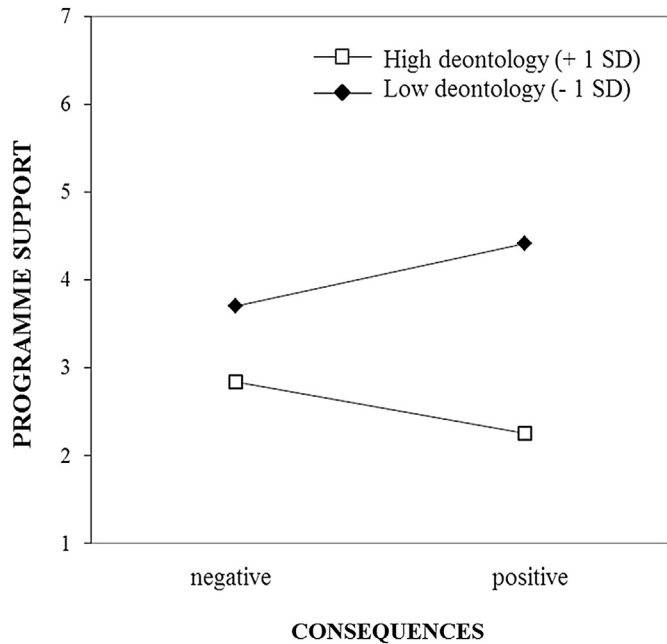


Fig. 1. Slope analysis. Interaction effect between individual's deontological stance and consequences valence on the attitude toward the market-based program for mitigation. Study 1.

deontological orientation was low ($-1SD$), the acceptance of the program tended to increase when the consequences were positive rather than negative ($\beta = .19, p = .11$). Conversely, when the individual's deontological orientation was high ($+1SD$), the predicted consequences had no impact on attitudes ($\beta = -.16, p = .16$), and the tendency was overturned as revealed by the beta coefficients comparison ($\beta_{low} - \beta_{high}: z = 2.73, p = .003$). Hence, when the anticipated consequences were negative, participants with a low level of deontology were more prone to support the program than participants with a high level of deontology ($\beta = -.25, p = .02$). However, when the consequences were positive the gap increased ($\beta = -.60, p < .001$) as the beta coefficients comparison showed ($\beta_{neg} - \beta_{pos}: z = 3.38, p < .001$).

Finally, since the preliminary analyses revealed differences in the participants' deontological orientation and in the attitude toward the program due to personal characteristics (age, gender and faculty), we computed additional analyses to verify a possible role played by these variables in the interaction between consequences and deontology. The regression in which the factor gender was included did not show any interaction effect between gender and the crucial variables, deontology and consequences ($ps > .34$). Neither faculty ($ps > .25$) nor age ($ps > .55$) interacted with deontology and consequences.

To summarize, in line with our hypothesis, the results showed that when the individual's deontology increases so does the derogation of the proposal. Furthermore, our data showed that this process occurs regardless of the effectiveness of the anticipated consequences. Overall, our findings suggested that the more people adopt a deontological approach toward environmental issues, the less they are willing to accept the program regardless of the anticipated consequences. In contrast, people with low deontological orientation are more affected by information about the anticipated consequences when judging the program. Indeed, similar to a taboo trade-off situation (e.g., Tetlock, 2003), the reaction of people with high deontological orientation is characterized by trade-off derogation and consequence insensitivity.

6. Study 2

6.1. Introduction

Study 2 aimed at extending previous results by focusing on some potential moderating variables. Specifically, we investigated whether the relationship between deontological orientation and the willingness to accept the cap-and-trade scheme was moderated by the individual's consequentialism.

A long tradition in moral reasoning tends to view deontology and consequentialism as mutually exclusive orientations. On the one hand, consequentialism assesses the rightness or wrongness of an action on the basis of its outcomes, with the means being irrelevant. On the other hand, the deontological approach determines an action's moral quality exclusively by the coherence between the behavior and the moral rule, no matter how positive the consequences.

The classical dichotomy of deontology-consequentialism is grounded in the context of moral dilemmas such as the "trolley problem" (Foot, 1967) and its variant "footbridge problem" (Thomson, 1985) and has received important support from recent research in neuroscience (Greene & Haidt, 2002; Greene et al., 2004; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001).

Although deontology and consequentialism are traditionally conceived of as two opposing poles on a continuum, an insightful line of research (Bartels, 2008; Bartels & Medin, 2007; Tanner et al., 2008) highlighted how deontological orientation and consequentialist considerations may be reconciled. As Bartels (2008) argued, people with high deontological orientation regarding a value should care about the final consequences of actions concerning such a value; that is, a morally engaged person may be, at the same time, more deontological and more consequentialist than an indifferent one. Furthermore, consequentialism and a cost-benefit analysis may also reinforce deontological motivation (Ditto & Liu, 2011), and sacred values may be related not only to a deontological orientation but also to consequentialism (Bartels & Medin, 2007).

According to this view, the rigid dichotomy of consequentialism-deontology could be an indicator, arising only when people are confronted with extreme moral dilemmas implying two incompatible options. Again, a win-win scenario may be a good example of a situation in which deontology and consequentialism are reconciled rather than contrasted, as they require neither the derogation of moral principles nor the sacrifice of final profits. Indeed, although people who hold a deontological approach experience moral outrage when facing a market-based proposal about nature, they could also be willing to accept the proposal after taking into consideration the ultimate benefits. More explicitly, we hypothesized that people with high deontological orientation toward the environment would be more likely to reject the cap-and-trade scheme than their low deontological counterparts. People high in deontology who also embrace a consequentialist perspective could be more supportive toward the option than people who totally refuse the consequentialist concerns.

6.2. Methods

6.2.1. Participants

A total of 170 psychology students at the University of Milano-Bicocca voluntarily took part in the study. The sample consisted of 109 females and 61 males between the ages of 19 and 46 ($M = 24.74; SD = 4.89$). All participants were Italian citizens.

6.2.2. Materials and procedure

Participants were approached in the campus library of psychology and asked to participate in a study on social perception.

Those students who agreed to participate were given a questionnaire to fill out. In the first page of the questionnaire, the instructions specified that participants had to fill out the questionnaire on perception of environment and climate change individually. The researcher monitored till the questionnaire was completed and returned.

After collecting the participants' demographic data (i.e., age, gender, and nationality), as performed in Study 1, a four-item scale assessing deontological orientation toward the environment was administered. In addition, participants were asked to respond to four items assessing consequentialism ("Regarding the environment, one should make decisions after a cost-benefit analysis of this topic"; Tanner et al., 2008). Afterward, participants were asked to read the article used in Study 1 that described the cap-and-trade scheme for mitigation. The scenario presented the proposal and—in agreement with cap-and-trade approaches—emphasized its positive consequences; the scheme was described as highly effective, likely to significantly reduce GHG emissions in the future and thus prevent damages for people and the environment.

Finally, after reading the scenario, the participants' attitudes toward the program were assessed using the same question used in Study 1. Participants provided all their responses on a 7-point scale, ranging from 1 (*absolutely not*) to 7 (*absolutely yes*). At the end of the questionnaire, participants were debriefed, thanked and released.

6.3. Results and discussion

To confirm that deontology and consequentialism are two distinct factors and not two opposite poles of the same dimension, we ran a factor analysis using the eight items from deontology and consequentialism (Tanner et al., 2008). This control is relevant because a long tradition of research on moral dilemmas tends to conceive of deontology and consequentialism as mutually exclusive orientations (Foot, 1967; Thomson, 1985). The maximum likelihood factor analysis with varimax rotation revealed two factors that accounted for 56.32% of the variance (see Table 2). Overall, four items consistent with deontology ($\alpha = .70$) were loaded on one factor and four items consistent with consequentialism were loaded on the other factor ($\alpha = .70$). Then, after computing a composite score for deontology and consequentialism, we analyzed the relationship between the two different moral orientations. Our data showed a slightly significant positive correlation between consequentialism and deontology ($r = .16, p = .04$). Therefore, our results suggested that the two different modes of moral reasoning were not strongly and negatively correlated.

Analogously to the first study, preliminary analyses on possible effects of participants' personal characteristics revealed that women ($M = 3.52, SD = 2.23$) were less willing to support the program than men ($M = 4.36, SD = 2.19$), $t(168) = 2.36, p = .02$. The t -test did not show any difference between men and women neither on deontology, $t(168) = -.73, p = .46$, nor on

consequentialism $t(167) = 1.48, p = .14$. Participants' age proved to be unrelated with the two modes of moral reasoning and with the attitude toward the program ($r_s < .13, p_s > .08$).

After verifying that deontology and consequentialism are two different factors, we explored a possible interaction effect between the two modes of moral reasoning on the attitudes toward the program through a hierarchical multiple regression analysis. In the first step, deontology and consequentialism were entered; in the second step, the product term representing deontology \times consequentialism was introduced. The continuous variables were centered before computation ($M_{deont} = 4.19, SD_{deont} = 1.30; M_{conseq} = 5.04, SD_{conseq} = 1.15$). Table 3 summarizes the results of the regression analysis.

As revealed by the analysis, the modes of moral reasoning were significantly related to attitudes. More specifically, although participants' consequentialist orientations proved to be positively related to the dependent variable ($\beta = .20, p = .01$), deontological orientation was negatively associated to it ($\beta = -.17, p = .02$). Thus, the more people adopt a consequentialist approach about environmental concerns, the more they are likely to support the program to mitigate emissions. In contrast, the higher the a priori deontology, the lower the acceptance of such a program.

Moreover, the analysis revealed a significant deontology \times consequentialism interaction ($\beta = .16, p = .03$). The slope analysis plotted in Fig. 2 showed that when the individual's consequentialist orientation was low ($-1SD$), support for the program tended to decline in relation to an increase in deontology ($\beta = -.31, p = .004$). Conversely, when the individual's consequentialist orientation was high ($+1SD$), deontology was no longer related to attitude ($\beta = -.03, p = .76$). When the level of deontology was low, participants' consequentialism was not related to the attitude ($\beta = .06, p = .52$), whereas when the level of deontology was high participants' consequentialism was significantly and positively related to the program support ($\beta = .34, p = .001$). The low level of the variance inflation factor ($VIF < 1.04$) allowed us to exclude any collinearity between predictors.

Finally, we computed additional analyses to verify a possible role played by gender and age in the interaction between deontology and consequentialism. The regression in which the factor gender was included did not show any interaction effect between gender and the crucial variables ($p_s > .52$). In the same way, the multiple regression including age did not show any interaction effect between age, deontology and consequentialism ($p_s > .30$).

Overall, these results supported those of Study 1 and provided converging evidence: the more participants held high deontological moral regard for the environment, the more likely they were to refuse the scheme, although it was presented as a win–win option. Despite earlier concerns, the data also suggested that the deontological approach does not preclude the use of a utilitarian cost–benefit analysis. Moreover, in line with our hypothesis, consequentialism proved to be a moderator of the relationship between deontology and the reaction toward the proposal. Although the

Table 2
Item scores, factor loadings and Cronbach's alphas. Study 2.

	Mean	SD	Factor loadings	α
Deontology				.70
deon1	4.53	1.70	.51	
deon2	4.44	1.70	.68	
deon3	4.38	1.97	.80	
deon4	3.39	1.83	.47	
Consequentialism				.70
cons1	4.93	1.59	.75	
cons2	4.98	1.56	.70	
cons3	4.90	1.73	.56	
cons4	5.37	1.46	.43	

Table 3

Multiple regression analysis to test the interaction between deontology and consequentialism on the attitude toward the cap-and-trade program. Study 2.

Predictors	R^2	F (Sig)	β	β	t	p
First step	.05	4.20 (.02)				
Deontology			-.27	-.16	-2.03	.04
Consequentialism			.38	.19	2.41	.02
Second step	.07	4.39 (.005)				
Deontology			-.30	-.17	-2.27	.02
Consequentialism			.40	.20	2.58	.01
Deontology \times Consequentialism			.21	.16	2.14	.03

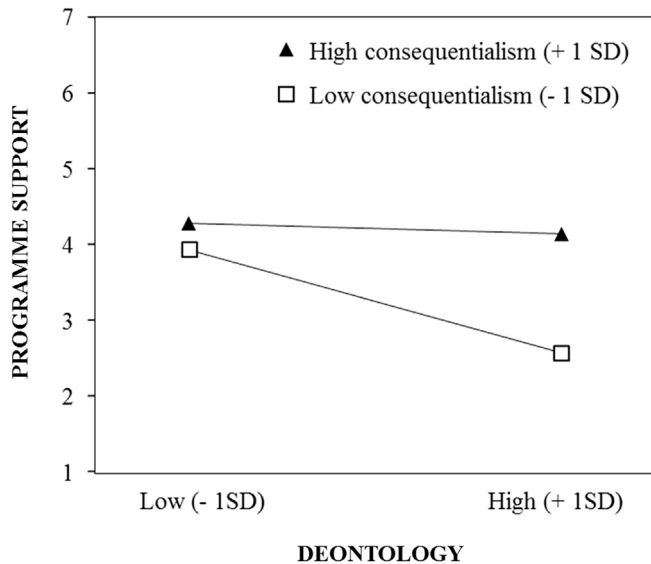


Fig. 2. Slope analysis. Interaction effect between individual's deontological and consequentialist approach on the attitude toward the market-based scheme for mitigation. Study 2.

evidence indicated that the deontological approach had a general negative relation with the attitude toward the market-based program, participants with high deontological orientation were more supportive when they also embraced a consequentialist perspective and did not refuse a cost–benefit analysis.

7. Study 3

7.1. Introduction

Study 1 revealed that the more people adopt a deontological approach toward environmental issues, the less they are willing to accept the cap-and-trade scheme regardless of its positive or negative consequences. Study 2 expanded these findings showing that the individual's consequentialism toward the environment is likely to moderate the deontological stance effect on the attitude toward the market-based approach. To this aim, in Study 2 participants were presented with the win–win version of the scenario. On the basis of these findings, the purpose of Study 3 was twofold. Firstly, it aimed at replicating prior pattern of results exploring the interactive effect between individual's deontology and consequentialism on the attitude toward the program when the anticipated consequences were positive rather than negative. In other words, we further tested our hypotheses, merging the paradigm of Study 1 and Study 2 in a more comprehensive experimental design. Secondly, in Study 3 we assessed the willingness to accept the market-based approach through different variables—including a task of monetary allocation—in order to increase the measure reliability.

7.2. Methods

7.2.1. Participants

A total of 160 psychology students (128 female) at the University of Milano-Bicocca were recruited for this study, aged between 19 and 45 ($M = 22.03$; $SD = 3.21$). All participants were Italian citizens.

7.2.2. Materials and procedure

Participants were approached in the campus libraries and asked to participate in a study on social psychology. Those students who

agreed to participate were given a questionnaire to fill out. In the first page of the questionnaire, we specified that participants had to fill out the questionnaire individually.

After collecting the participants' demographic data (i.e., age, gender, and nationality), as performed in Study 2, participants were asked to respond to four items assessing deontological orientation toward the environment and to four items assessing consequentialism (Tanner et al., 2008).

Next, participants were asked to read the scenario that described the cap-and-trade program for mitigation. As in Study 1, in the final part of the scenario, we illustrated the possible consequences of the experimental program. Thus, half of the sample was told that the anticipated consequences were extremely positive and that the program would be extremely effective at reducing GHG emissions and preventing future damages for the environment and people's health (positive consequences); the other half was told that the program would be totally ineffective at reducing GHG emissions and unlikely to prevent future damages (negative consequences). Participants were randomly assigned to one of the two experimental conditions.

After reading the scenario, the participants expressed their attitude toward the program along five affirmations (e.g., "To what extent are you in favour of introducing the program described in the scenario?"; "Would you vote for a politician who introduce the program X among the political priorities?"). Then they were virtually endowed with 10,000 euros and asked to choose in a matrix the pattern of monetary allocation between the program X for climate change mitigation and an association for cancer research (see Appendix A for the complete list of items).

Finally, two items of manipulation check were introduced to verify that participants properly perceived the consequence manipulation (i.e., "Independently from your opinion, how effective is the program at reducing risks for people and the environment?", "Independently from your opinion, how effective is the program from an economic point of view?"). Participants provided all their responses on a 7-point scale, ranging from 1 (*absolutely not*) to 7 (*absolutely yes*). At the end of the questionnaire, participants were debriefed, thanked and released.

7.3. Results and discussion

First, to verify that our manipulation was effective, a *t*-test on the two items of consequences evaluation (*manipulation checks*) was performed in order to compare the two experimental groups (consequences: positive vs. negative). The analysis revealed that program consequences for the environment were estimated to be more effective in the positive condition ($M = 3.61$, $SD = 1.80$) than in the negative condition ($M = 1.96$, $SD = 1.29$), $t(157) = 6.74$, $p < .001$, $d = 1.05$. In a similar vein, program economic consequences were estimated to be more positive in the positive condition ($M = 5.03$, $SD = 1.42$) than in the negative condition ($M = 3.70$, $SD = 2.14$), $t(157) = 4.45$, $p < .001$, $d = .73$. Thus, we can conclude that our experimental manipulation was successful and that the participants properly perceived the information about the outcomes.

Preliminary analyses on the socio-structural data did not show any difference between men and women on deontology, $t(158) = .14$, $p = .89$, consequentialism, $t(158) = -.82$, $p = .42$, attitude, $t(158) = .71$, $p = .48$, and monetary allocation, $t(158) = .67$, $p = .50$. Participants' age was positively correlated with monetary allocation ($r = .25$, $p < .001$) and unrelated with the other variables ($rs < .12$, $ps > .14$).

Then, after computing a composite score for the attitude toward the program ($\alpha = .96$), we analyzed the interactive effect between the participants' modes of moral reasoning (i.e., deontology and

consequentialism) and the anticipated consequence on the attitude through a hierarchical multiple regression. In the first step, we entered deontology and consequentialism as a continuous variables and consequences as a dummy variable. In the second step, the product terms representing deontology \times consequences, consequentialism \times consequences, and deontology \times consequentialism were introduced. Finally in the third step, the interaction deontology \times consequentialism \times consequences was included. The two continuous variables were centered on their mean before computation ($M_{deont} = 4.95$, $SD_{deont} = 1.02$; $M_{conseq} = 5.50$, $SD_{conseq} = .81$). The same procedure was used to analyze the effects on the monetary allocation task. Table 4 summarizes the results of these regression analyses (for brevity only the third step was reported).

The analysis revealed that the anticipated consequences strongly affected the attitude toward the program ($\beta = .49$, $p < .001$) and the monetary allocation to support it ($\beta = .42$, $p < .001$): as expected, when the environmental and economic consequences were described as highly positive participants showed greater support than when the consequences were negative. More interestingly, the analysis highlighted that this strong effect is moderated by a deontology \times consequences interaction: hence, the interaction between deontology \times consequentialism \times consequences proved to be significant both on attitude toward the program ($\beta = .22$, $p = .01$) and on monetary allocation ($\beta = .23$, $p = .009$). The slope analyses plotted in Fig. 3 showed that, when the anticipated consequences were negative, deontology and consequentialism did not interact neither on the attitude toward the program ($\beta = -.21$, $p = .15$) nor on the allocation task ($\beta = .06$, $p = .66$). This pattern of results could be due to a floor effect: when the consequences both for economics and for environment were described as negative the support toward the program was very low and it was not affected by individual's deontological or consequentialist approach.

More interesting, in positive condition, the analysis yielded a significant interaction effect between deontology and consequentialism both on the attitude toward the program ($\beta = .41$, $p = .05$) and on the allocation task ($\beta = .54$, $p = .01$). When the individual's deontological mandate was low, the difference between participants with a low ($-1SD$) and high ($+1SD$) level of consequentialism was not significant on the attitude ($\beta = -.20$, $p = .24$) but tend to be significant on the monetary allocation ($\beta = -.31$, $p = .07$). We did not anticipate this marginal result that we found only in the dataset of Study 3 and in relation to the allocation task. Therefore we did not discuss it more thoroughly in the manuscript: if such a pattern would be replicated in future research, this would represent an interesting nuance that might be worthy of further consideration.

On the contrary, when the individual's deontological mandate was high, the higher was the consequentialist approach the higher was the positive attitude toward the program ($\beta = .38$, $p = .06$) and greater the amount of money allocated to fund it ($\beta = .54$, $p = .01$).

Furthermore, when the consequentialism was low, the individual's deontology tended to negatively affect the support toward the program ($\beta = -.30$, $p = .16$) whereas, when the consequentialism was high this tendency was overturned ($\beta = .27$, $p = .12$) as revealed by the beta coefficients comparison ($\beta_{low} - \beta_{high}$: $z = 5.26$, $p < .001$). On the allocation task, when the consequentialism was low, the individual's deontology had a negative effect on funding ($\beta = -.63$, $p = .004$) whereas deontology had no impact when consequentialism was high ($\beta = .11$, $p = .61$). Analogously to Study 2, consequentialism and deontology proved to be independent ($r = -.08$, $p = .32$). The low level of the variance inflation factor ($VIF < 1.77$) allowed us to exclude any collinearity between predictors. There were no interactive effects involving participants' gender or age.

In sum, consistent with our previous studies, the results of the present experiment indicated that participants with a high deontological approach toward the environment were less likely to support the market-based mitigation scheme. However this was true only when their level of consequentialism was low: deontological people were prone to accept and to endorse such a scheme if they did not refuse a cost–benefit analysis and the consequentialist approach.

Moreover, in line with prior research (Bartels, 2008; Tanner et al., 2008) and the theoretical assumption, the results suggested that deontology and consequentialism could be conceived as two distinct factors instead of two poles on the same continuum. These findings imply that the two moral approaches could be combined and integrated during moral reasoning processes rather than contrasted.

8. General discussion

The present research focused on moral reasoning and deontological reactions toward the cap and trade approach to climate change mitigation, which proposes a system of tradable emission rights (Grasso, 2013; Montgomery, 1972; Singer, 2002). This market-based scheme presents some distinctive characteristics that make such a scenario particularly interesting. First, it concerns the environment and natural resources that are traditionally conceived as sacred values to protect (Baron & Spranca, 1997; Fiske & Tetlock, 1997). Furthermore, as in the classical taboo trade-off scenario it proposes a commodification of the natural

Table 4
Multiple regression analysis (step 3) to test the interaction between deontology, consequentialism and consequences on the attitude toward the cap-and-trade program and on monetary allocation task. Study 3.

Predictors	R ²	F (Sig)	β	β	t	p
Attitude	.28	8.57 (.001)				
Deontology			.03	.02	.19	.84
Consequentialism			-.36	-.18	-2.04	.04
Consequences			1.57	.49	7.07	.001
Deontology \times consequentialism			-.20	-.10	-1.21	.23
Deontology \times consequences			.12	.05	.53	.59
Consequentialism \times consequences			.32	.10	1.15	.25
Deont \times conseq \times consequences			.79	.22	2.60	.01
Monetary allocation	.26	7.70 (.001)				
Deontology			-.04	-.02	-.23	.82
Consequentialism			-.32	-.13	-1.48	.14
Consequences			1.62	.42	5.94	.001
Deontology \times consequentialism			.06	.03	.30	.76
Deontology \times consequences			.19	.07	.71	.48
Consequentialism \times consequences			-.44	-.12	-1.28	.20
Deont \times conseq \times consequences			1.01	.23	2.65	.009

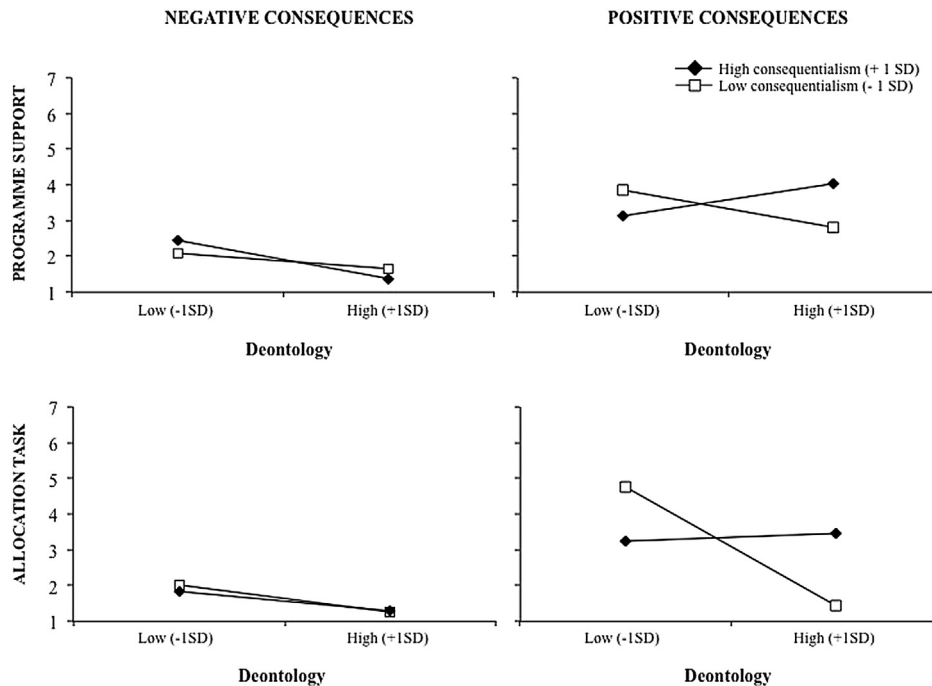


Fig. 3. Slope analysis. Interaction effect between individual's deontological stance, consequentialism and consequences valence on the attitude toward the program and on monetary allocation task. Study 3.

values—namely the possibility of paying for emission rights. Unlike a taboo trade-off, however, the current scenario actually implies a win–win solution (Nielsen, 2009) because it is likely to satisfy both ethical and material concerns (Grasso, 2013).

In line with our hypothesis, the results of the three studies consistently showed a significant negative relationship between individual's deontological stance and their willingness to accept the proposal. Indeed, the more people held a deontological approach about nature, the more likely the case that they would reject the cap and trade mitigation program, despite its promise of great economic profit and great benefit for the environment. Moreover, consistent with previous research on protected values, deontological peoples' attitudes toward such a decisional option are related to consequence insensitivity (Baron & Spranca, 1997; Bartels & Medin, 2007; Tanner & Medin, 2004; Tanner et al., 2008). As Study 1 showed, when deontological thinking is pronounced the presentation of the possible outcomes (even in an extremely positive vs. extremely negative way) does not affect the individual's reaction toward the cap and trade mitigation scheme. The results of Study 2 and Study 3 revealed that highly deontological people are more willing to accept the proposal when they take into consideration concerns for consequences and do not neglect a cost–benefit analysis.

Overall, our findings suggest that the deontological reaction when facing the cap and trade approach to mitigation is similar to that elicited by a taboo trade-off: individuals with high deontological orientation are likely to promptly refuse a proposal that they perceive as a moral outrage, regardless of the resulting benefits (Tetlock, 2003).

From a theoretical point of view, the implications of our findings are twofold. First, our data suggest that the potential effects of a traditional taboo trade-off scenario and a win–win solution can differ. In a traditional taboo trade-off scenario (e.g., money for deforesting), people may decide to renounce the profit to safeguard their principles, to respect the moral rule, and to protect a sacred value. In contrast, when people are presented with a win–win solution, the proposal derogation leads to a paradoxical effect: people with a high deontological orientation tend to reject options

that imply advantages for the values that they want to protect (i.e., the environment). In other words, treating such an approach as a taboo trade-off could lead people to make a suboptimal choice from both ethical and economic perspectives.

A second aspect of the present findings is theoretically noteworthy, namely, the relationship between deontology and consequentialism. Although many studies on moral dilemmas conceive of deontology and consequentialism as two opposite poles on the same continuum, the second study revealed that the two different orientations may be integrated during moral reasoning, in line with more recent approaches (Bartels, 2008; Bartels & Medin, 2007; Tanner et al., 2008). In other words, a morally engaged person may hold both a deontological orientation, and concerns about decision consequences. Actually, a total lack of concern for consequences of a deontological person and a total lack of concern for the means of a consequentialist person seem unlikely in everyday life; thus, the rigid dichotomy of consequentialism–deontology could merely be an indicator, arising only when people are confronted with extreme moral dilemmas which imply two incompatible options (Foot, 1967; Thomson, 1985). In this regard, the cap and trade mitigation scheme—as conceptualized in the current study—is far from being an extreme moral dilemma. On the contrary, it is a scenario in which Good and Right do not conflict, and in which, the individual has the opportunity to effectively reconcile deontology with consequentialism.

There are, of course, some limitations to this study. First, our sample population consisted mostly of university students who voluntarily participated. Thus, replicating the pattern of our results with a diverse sample of adults would be necessary in order to improve the ecological validity of our assumptions. A second important point concerns the scenario, which was the same in the three studies: one interesting proposal for future research is to apply the present results to different decisional scenarios while varying the concerns (e.g., human life, human rights), and the problem structure. These further studies could clarify if the results that we obtained are specifically related to the reaction toward the market-based program for mitigation or can be generalized to other fields.

These preliminary results raise a number of stimulating questions that may be addressed in further studies. An interesting extension of our work could be focused on communication factors and variables likely to improve the level of understanding and acceptance of the win–win solution. In fact, the findings suggest a general skepticism and scarce support of the market-based approach to climate change mitigation (overall, the level of support was low). For instance, a greater consensus on the cap and trade scheme could be reached through the manipulation of cognitive factors, helping people to process information on the consequences and fostering factual and counterfactual thinking (Baron & Leshner, 2000). A second line of intervention could involve emotions, in order to reduce affective and heuristic answers and to promote a deliberative way of thinking (Bartels, 2008; Greene et al., 2001). Finally, future research should explore the role of social variables such as intragroup communication and the development of group norms.

Further studies will also investigate the direct comparison between the individual's moral reaction toward a taboo trade-off in which the sacrifice of the sacralized values, such as human life, rights, and nature, are compensated by economic benefit and toward an apparent trade-off that actually implies a win–win solution. Furthermore, it could be important to integrate a deeper understanding of how people think about win–win situations, how they cognitively process the related information during moral reasoning, and why they finally support or refuse the option.

8.1. Conclusion

The present research may also have some relevant practical implications. The current literature on the ethical aspects of climate change shows that the diverging answers for the duty of mitigation are vividly debated and highly controversial, depending on different inspiring moral principles (Gardiner, 2010; Moellendorf, 2009). Thus, the mainstream mitigation strategy is largely based on deontological approaches grounded in the prohibition of abusing the atmospheric absorptive capacity, in possessing or violating rights, and in having duties, obligations, or responsibilities (Shue, 1999). Although the principles of equality and justice promoted by these approaches are morally unassailable, the scant acceptance and instrumental use of such principles in policy debates (Caney, 2010), along with the high costs of this climate policy (Weyant, 2004), led climate negotiations to a well-known deadlock (Parks & Roberts, 2010). On the other side, a consequentialist approach to mitigation based on international systems of tradable emission rights runs into important deontological constraints, as revealed by the present study. Indeed, cognitive psychology, in studying moral processes may offer important indications for the ethics of mitigation in order to lessen its controversial nature and increase its practical and political feasibility.

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Appendix A

Scenario presented to participants and manipulation of the possible consequences of the cap-and-trade program for mitigation (in Italian in the original version).

As you probably know, the atmospheric pollution is overcoming. In order to reduce greenhouse gas (GHG) emissions and to limit the damage, some public corporations proposed to introduce an experimental program, the Program X.

The Program X is a cap-and-trade scheme, based on the allocation of emission rights. Each emission right authorizes the release of a specified amount of GHG (CO₂E). The total number of emission rights is equivalent to the overall emissions cap. Emission rights trading is allowed. Thus, the parties that undertake the majority of GHG cutbacks for efficiency reasons should therefore be fully compensated by parties where marginal abatement costs are inefficiently high. In sum, who wants to pollute has to pay and who pays can pollute.

After an environmental and economic analysis, experts foresee the Program X to be extremely effective and likely to significantly reduce GHG emissions and to prevent future damages for environment and people health (*positive condition*).

After an environmental and economic analysis, experts foresee the Program X to be totally ineffective and unlikely to reduce GHG emissions and to prevent future damages for environment and people health (*negative condition*).

Measures of deontological and consequentialist orientation toward the environment (adapted from Tanner et al., 2008). The items were presented in Italian in the original questionnaires.

With regard to the environment, one has to make decisions...

- ... consistent with principles people have to follow (*deon 1*)
- ... on the basis of the moral duty to behave in a certain way (*deon 2*)
- ... thinking that some behaviors are definitely right or wrong, irrespective of the consequences (*deon 3*)
- ... excluding the alternative that are morally forbidden (*deon 4*)
- ... after a cost–benefit analysis (*cons 1*)
- ... choosing the option that can be justified by its consequences (*cons 2*)
- ... choosing the option that produces the best net value (*cons 3*)
- ... choosing the option of which the positive outcome outweigh the negative consequences (*cons 4*)

Measures of attitude toward the market-based program for mitigation. In Italian in the original version.

- Are you in favor of introducing the program X described in the scenario? (Study 1, 2 and 3)
- If you were member of a committee with decisional power that has to decide about the application of the program X, would you support its introduction? (Study 3)
- Would you vote for a politician who introduced the program X amongst the main points of his/her political agenda? (Study 3)
- Would you take part in a collective action aimed at promoting program X in the territory? (Study 3)
- Do you think all nations should introduce the program X? (Study 3)

Matrix used in the monetary allocation task (Study 3)

Option	□ 1	□ 2	□ 3	□ 4	□ 5	□ 6	□ 7	□ 8	□ 9	□ 10	□ 11
Cancer research	100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
Program X	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

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