



## Explaining pro-environment consumer behavior in air travel

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### A B S T R A C T

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Some airlines and airports have begun offering a voluntary carbon offsetting service. This article examines the behavior of passengers with respect to their preparedness to compensate for CO<sub>2</sub> emissions. Responses from an online-survey of air travelers suggest severity, self-perception, and importance are positively related to willingness-to-compensate. How passengers perceive their self-effectiveness in reducing CO<sub>2</sub> emissions does not affect willingness-to-compensate, but influences likelihood of compensating directly.

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### 1. Introduction

Air travel is widely acknowledged to significantly impact global climate through the emissions of greenhouse gases (GHGs), including carbon dioxide (CO<sub>2</sub>). With the inclusion of aviation in the European Union Emissions Trading Scheme (EU ETS) planned for 2012, the air transportation sector “is about to feel the full blast of regulatory heat” (Turner, 2009). Steps have already been taken to improve aircraft technological but measures to modify air travel behavior remains limited still. Airlines and airports have started offering voluntary carbon offsetting schemes to air travelers.

Little is known, however, about the acceptance of voluntary carbon offsetting schemes (Hooper et al., 2008). When it comes to pro-environment behavior the theory of planned behavior (TPB) may offer useful insights.<sup>1</sup> Here we use it to look at the factors that affect an air traveler’s willingness-to-compensate for CO<sub>2</sub> emissions and whether the willingness-to-compensate affect likelihood of compensating.

### 2. Hypotheses

First, four constructs (perception of severity, perceived consumer effectiveness, self-perception, and importance) are examined for their predictive ability regarding a consumer’s intention to behave pro-environmentally when flying. This intention is represented as

the consumer’s willingness-to-compensate for CO<sub>2</sub> emissions. Then, the consumer’s willingness-to-pay is examined with regard to consumers’ likelihood to compensate for CO<sub>2</sub> emissions.

A consumer’s attitude towards certain behavior relates to the extent to which a consumer evaluates that behavior either favorably or unfavorably. Previous studies have found that attitudes are valid predictors of pro-environment behavioral intentions (e.g., Minton and Rose, 1997). For example, a person who demonstrates a positive attitude towards organic food products is more likely to purchase in organic supermarkets. Laroche et al. (2001) has also found that consumers who perceive ecological problems as having severe consequences for the security of the world, are willing to pay more for the consumption of ecological products. Hence,

*H1: Consumers who perceive that CO<sub>2</sub> emissions from air travel create a severe ecological problem are more willing-to-compensate for these emissions.*

Closely related to TPB is the concept of perceived consumer effectiveness (PCE), defined as “the extent to which the consumer believes that his personal efforts can contribute to the solution of a problem” (Vermeir and Verbeke, 2006): With high PCE a consumer will likely translate a positive attitude towards a specific issue into actual behavior. Here it is expected that a consumer who is convinced of the positive effect on the environment of the individual contribution is more willing-to-compensate for CO<sub>2</sub> emissions from air travel. Thus,

*H2: Consumers who perceive that their individual efforts to prevent or reduce CO<sub>2</sub> emissions from air travel have a positive effect on the environment as a whole are more willing-to-compensate for these emissions.*

Consumers who behave pro-environmentally in one area are likely to do the same in others. Hence,

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<sup>1</sup> It has been used for example for examining pro-environment food consumption (Vermeir and Verbeke, 2006) and consumer behavior pertaining to beverage packaging (Van Birgelen et al., 2009).

*H3: Consumers who behave pro-environmentally in areas other than air travel are more willing-to-compensate for CO<sub>2</sub> emissions from air travel.*

McCarty and Shrum (2001) investigated the behavioral context of recycling. When consumers are more aware of the importance of recycling they are more likely to recycle waste. Laroche et al. (2001) investigated the demographic, psychological and behavioral profiles of consumers who are willing to pay more for environmentally friendly products. These consumers think that it is important to behave in an ecologically sound way and we therefore expect consumers who find it important to behave pro-environmentally to be more willing-to-compensate for CO<sub>2</sub> emissions from air travel. Thus,

*H4: Consumers who view pro-environment behavior as important to themselves or society as a whole are more willing-to-compensate for CO<sub>2</sub> emissions from air travel.*

Behavioral intentions are generally thought to offer good predictions of actual behavior (Ajzen, 1991). We expect a consumer's willingness-to-compensate for CO<sub>2</sub> emissions from air travel to positively influence the likelihood of compensating. Consumer volitional control is required for the transfer of intention into actual behavior. Because voluntary carbon offsetting schemes allow for such control, we posit,

*H5: A consumer's willingness-to-compensate for CO<sub>2</sub> emissions from air travel is positively related to his or her likelihood of compensating.*

### 3. Empirical analysis

Cross-sectional data were gathered through an online survey, using NetQuestionnaires software provided by Maastricht University.

Invitations to participate were sent out by e-mail, containing a link to the questionnaire. First, the e-mail was addressed to family and friends, who were kindly requested to forward the invitation to as many people as possible; basically a 'snowball-sampling' (Schmidt and Hollensen, 2006). Second, the invitation was sent to the online research panel of Maastricht University. Third, the invitation was published on online community websites, such as Facebook. To limit the social desirability bias, which is associated with environmental issues (MacKerron et al., 2009), anonymous participation was guaranteed. About 250 responses were received. Of these, 128 questionnaires were fully completed. The sample consisted of 46% male and 54% female respondents with about 16% of respondents being frequent business travelers. Most respondents were aged 25–34 years and resided in the Netherlands.

The questionnaire was first pretested and consisted of items that were adapted from previous studies (Table 1). Respondents were asked to indicate their level of agreement/disagreement with these items, which were all scored on a 7-point Likert-item scale ranging from 1 = totally disagree to 7 = totally agree. Willingness-to-compensate was measured using Likert-type items as well as an open question asking for the maximum amount respondents would be willing-to-pay to compensate for CO<sub>2</sub> emissions from flying. Here, a distinction was made between short- and long-haul flights. To assess the likelihood of compensating, respondents were instructed to reflect on several hypothetical offers by an airline to compensate for CO<sub>2</sub> emissions, similar to MacKerron et al. (2009). The questionnaire ended with demographic questions about gender, age, place of residence, and purpose for air travel.

The data were analyzed using structured equation modeling involving partial least squares (PLS) estimations and making use of SmartPLS (Ringle et al., 2005). PLS is an analysis technique that

**Table 1**  
Measurement items and descriptions.

Construct	Items	Mean	Std. dev.
Perception of severity (based on Van Birgelen et al., 2009)	In my opinion, CO <sub>2</sub> emissions from air travel have a serious negative impact on the environment	5.13	1.24
	One of the major causes of environmental damage is CO <sub>2</sub> emissions from air travel	4.17	1.27
	I believe that CO <sub>2</sub> emissions from air travel is a very important environmental issue	4.79	1.29
Perceived consumer effectiveness (based on Van Birgelen et al., 2009)	When I compensate for CO <sub>2</sub> emissions from air travel, I feel that I am doing something positive for the environment	4.41	1.38
	I believe that my decision to compensate for CO <sub>2</sub> emissions from air travel has a direct influence on the environment as a whole	3.89	1.42
	My choice to compensate for CO <sub>2</sub> emissions from air travel has no direct impact on the environment*	3.84	1.29
Self-perception (based on Kaiser et al., 1999)	I collect and recycle used paper	5.96	1.29
	I usually buy drinks in returnable bottles	5.11	1.53
	I prefer a paper bag over a plastic bag when shopping	4.87	1.56
	When possible for travel to nearby areas, I use public transportation or ride a bike	4.75	1.67
Importance (based on McCarty and Shrum, 2001)	Compensating for CO <sub>2</sub> emissions from air travel will reduce pollution	4.35	1.23
	Compensating for CO <sub>2</sub> emissions from air travel is important to saving natural resources	4.71	1.12
Willingness-to-compensate (based on Oreg and Katz-Gerro, 2006)	I am willing-to-compensate for CO <sub>2</sub> emissions from air travel to protect the environment	4.44	1.52
	I am willing to accept cuts in living standards to protect the environment	4.76	1.11
	I am willing to pay higher (ticket) prices to protect the environment	4.41	1.41
Likelihood of compensating (based on MacKerron et al., 2009)	I would take up this offer as a leisure traveler	4.16	1.52
	I would <i>only</i> take up this offer if part or all of it were paid by my employer*	4.23	1.65
	I would take up this offer if I received extra air miles in return**	3.69	1.63
	I would take up this offer if the airline offered me an <i>extra</i> free drink	3.50	1.47

Notes: \*Item recoded \*\*Item omitted due to factor loading < 0.5.

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