



# Negative income effect on perception of long-term environmental risk



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## ABSTRACT

The notion that people with higher income are more concerned about environmental problems is deeply entrenched in economics and some other disciplines. Studies have shown a positive income effect on the intention to pay for environmental improvement. Perception of environmental risk, however, follows a different pattern of variation. This paper demonstrates a negative income effect, using data extracted from a cross-national social survey involving 36 countries. An inverse relationship is observed between people's reported income and their perception of long-term environmental risks associated with climate change, genetic modification of crops and the use of nuclear power. Lower-income individuals see the potential environmental consequences of these human interventions as extremely dangerous—more so than the higher-income ones. Richer people are relatively less concerned about the long-term environmental risks. A possible explanation is that material insecurity reinforces the feeling of risk and danger. People living under more difficult economic situation are more vulnerable and see greater danger. A key implication of these findings is that concern does not follow the ability to pay. People facing higher environmental risks are potentially less able to afford risk reduction support despite that they are likely to be in greater need for it.

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## 1. Introduction

The notion that people's concern about the environment increases with income is deeply entrenched in economics and some other disciplines. It is most notably articulated by Lawrence Summers, then Chief Economist for the World Bank, in a leaked internal memo making a controversial claim that poor countries are 'under-polluted' and the demand for a clean environment is low among poor people (Guha and Martinez-Alier, 1997). Summer's opinion is consistent with the conventional assumption in mainstream environmental economics that improving environmental quality and avoiding environmental damage are a 'luxury' good. McConnell (1997, p. 395), for instance, is convinced that "households with higher incomes will pay more for reductions in risk".

Riley Dunlap laments the regrettable tendencies among some sociologists for reinforcing the conventional economic assumption (Dunlap and Mertig, 1995; Dunlap and York, 2008). His criticisms target at the sociologist Ronald Inglehart's (1977, 1990) theory of post-materialism. This influential theoretical account posits that members of advanced industrial societies are more concerned about environmental problems due to a gradual shift in people's values to higher-order, post-materialist desires as societies develop and accumulate a certain level of wealth. On the other hand, poor people struggle to satisfy basic needs and could afford no more to care about environmental issues. There is no shortage of empirical evidence supporting this view (Diekmann and Franzen, 1999; Franzen and Meyer, 2010; Scott and Willits, 1994; Shen and Saijo, 2008; Smyth et al., 2008).

However, a growing body of counter-evidence has called into question the post-materialist assumption. Other national and cross-national surveys have shown that environmental concern does not increase, or even declines with income (Baldassare and Katz, 1992; Brechin, 1999; Dunlap and Mertig, 1995; Knight and Messer, 2012; Lima et al., 2005; Marquart-Pyatt, 2008; Sandvik, 2008; Sjöberg, 2000). On long-term environmental issues, such as climate change, the most advanced industrial economies do not appear to be particularly keen on, if not skeptical toward undertaking aggressive actions for reducing such risks (Dunlap and York, 2008). Among these countries are Australia (Hanson, 2010; Lo, 2014; The Climate Institute, 2012), Norway (Norgaard, 2006, 2011), and the United States (Leiserowitz, 2005; The Pew Research Center, 2009). Higher levels of concern about long-term environmental change are not always found in the wealthier societies.

Understanding environmental concern in terms of risk or danger is one way to reconcile the competing arguments raised by sociologists, notably Inglehart and Dunlap. The strength of motivation to avoid potential environmental damage is a function of risk attitude and likely to decline with one's economic ability. Economists have long argued that at higher levels of wealth and income, individuals tend to be risk averse and become less willing to make commitment to risk mitigation (Halek and Eisenhauer, 2001; Guiso and Paiella, 2008). This implies that poorer communities and countries are less likely to take risk and more keen on engaging in risk mitigation activities. As Dunlap and others have suggested, these communities and countries should be more concerned about the environment—more accurately, the danger of environmental change.

Although income raises people's intention to pay for environmental amenities, it may have a non-positive or even negative effect on risk-based environmental concern. This paper draws a distinction between these two concepts. Identifying the negative income effect will have important implications for designing market-based policy approach, particularly the use of risk-pricing instruments, such as flood or climate insurance (Botzen et al., 2009; Chobotová, 2013; Lo, 2013a). Prices select those households who are able to pay, but insuring might be relatively less important for the wealthier, who are more self-sufficient and have greater capacity for coping and recovering, than those who cannot afford but are more vulnerable to the impending crisis. If danger declines with income, then unsubsidized price-based solutions might unduly displace the poorer public who live at higher risks and select the wealthier at lower risks. Unlike environmental amenities, the potential major 'consumer' of risk reduction efforts is likely to be the economically deprived, rather than the rich. The role and design of market mechanisms warrant careful consideration in this light.

This paper aims to demonstrate the negative income effect on environmental risk perception. The core argument is supported by the results of a cross-national social survey involving 36 countries worldwide. Using basic statistical techniques, this study identifies the direction in which people's income and the perception of long-term environmental risks are related to each other. The next section further elaborates on the theoretical distinction between intention to act and risk perception. Research methods are then described, followed by an analysis and discussion of the survey data.

## 2. Income and the Two Dimensions of Environmental Concern

There is mixed evidence on the effect of income (Aklin et al., 2013; Van Liere and Dunlap, 1980). Inglehart himself has acknowledged the existence of competing evidences and modified the post-materialism theory by proposing an 'objective problems–subjective values' (OPSV) hypothesis (Inglehart, 1995). The OPSV hypothesis suggests that environment concern is a function of objective environmental conditions, and not only subjective post-materialist values. The 'objective' argument is that since lower income countries suffer from more serious domestic environmental degradation, their citizens tend to express higher levels of support for the environment. The 'subjective' dimension of the modified theory still affirms the positive effects of income and wealth.

The OPSV hypothesis is said to be flawed. This theoretical account implies that the poorer nations would rate local environmental problems as more severe than do their richer counterparts, whereas the latter would rate global problems as more severe. However, empirical evidence does not offer clear support to this view (Brechtin, 1999). The 'objective' argument accounts for the immediate environmental conditions and assumes that people's concern directly responds to environmental realities. A limitation of this argument is that it does not explicitly address the subjective facet of vulnerability and exposure to 'objective' environmental stresses. The sense of risk and danger does not necessarily depend on observed environmental deteriorations, but is subject to various forms of cultural and cognitive biases (Slovic, 1987, 2000; Douglas and Wildasky, 1982; Wildasky, 1987). Adverse environmental changes that are hardly observable can still trigger strong public reaction in the 'risk society' (Beck, 1992). Thus, the subjective and objective dimensions of environmental concern are not entirely independent on each other. The OPSV hypothesis that distinguishes between them is not deemed to be a plausible approach for explaining income effects (Dunlap and York, 2008).

Rather than making such a distinction, the present study suggests that a clearer pattern can be demonstrated by isolating the risk-based component of environmental concern. The concept of environmental concern has at least two core components. For example, Dunlap and York (2008, p. 533) define environmental concern as "concern about environmental problems and support for environmental protection". Similarly, Franzen and Vogl (2013, p. 1002) describe it as "an individual's

insight that humans endanger the natural environment combined with the willingness to protect nature". The first half of these two definitions essentially connotes risk, which refers to the possibility that an undesirable state of reality may occur as a result of natural events or human activities (Renn, 2008). Concern about the danger of an impending crisis is not congruent with the second half, which connotes intention to act. Adequate resources enhance the ability of people to act, but can also protect them from contingencies and accelerate recovery process. Knowledge of being protected and the feeling of security can reduce the sense of danger (Bubeck et al., 2012). Income plays the dual role of enabling action and mitigating risk perception.

This perspective is useful for understanding some seemingly contradictory observations. Leiserowitz (2005, p. 1440) has found that "most American demonstrate a high awareness of global climate change", but "the majority of the American public does not currently consider climate change as an imminent or high-priority danger" (emphasis added). In the U.K., Whitmarsh (2011, p. 698) also notes that "the current study shows belief that climate change is human-caused is unchanged but that perceived severity of the issue may instead have been affected" (emphasis added). So people who are sufficiently aware and understand the science do not necessarily worry, or believe that human activities are doomed to produce serious or dangerous consequences for human society or the environment. This is particularly true for long-term environmental problems, because the majority of the catastrophic impacts are widely diffused across continents and generations.

The distinction that these authors have noted raises question about the ways in which some economists and social scientists conceptualize the income effect. For example, McDonnell's (1997) view that the wealthy household will pay more for risk reductions conflates willingness to pay, which connotes an intended action, with the perceived need for risk mitigation, which depends on the sense of danger. As a result of the failure to make a distinction between these concepts, the understanding of environmental concern is detached from the risk literature which has suggested that risk aversion declines with wealth (Halek and Eisenhauer, 2001; Guiso and Paiella, 2008).

In the light of the analytic distinction of risk, this paper argues that risk perception should decline with personal and household incomes. Stable income (and wealth) is the ultimate source of protection from rare catastrophes. The wealthy households are protected from dangerous events and feel safer, even though they are willing and able to pay for risk reduction. The poorer households, in contrast, have stronger survival demand for risk reduction despite their lower ability to pay. Concerns about environmental risks and willingness or ability to pay do not necessarily cohere. This is demonstrated by the research reported in the remainder of this paper.

## 3. Survey Data and Measures

Access to the cross-national survey dataset was provided by the International Social Survey Program (ISSP) (ISSP Research Group, 2012). The ISSP is a continuing annual program of cross-national collaboration on surveys covering topics important for social science research. Most of the survey data are openly available. The 2010 Environment Module of the ISSP maintains a collection of national surveys conducted during 2009–2011 and involved 36 countries (Table 1). Participating countries are represented in the program by independent academic research units or commercial research service providers that are appointed to collect individual data in their countries.

The ISSP Environment Module deals with attitudes to the environment, environmental protection, respondents' behavior and preferences regarding governmental measures on environmental protection. Participating countries gathered data using a standardized questionnaire and methodology in accordance with the ISSP's requirements. The majority of the data were solicited from face-to-face interviews; nonetheless, mixed survey formats (telephone, mail or web surveys) were employed in some cases. Stratified random sampling methods

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