

The Influence of Environmental Policy on Willingness to Pay: The Mediating Effect of Environmental Perception

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Abstract. Environmental issues have always been a concern for both the government and the public. How to effectively formulate and implement environmental policies in order to build a better environment is a problem that the government needs to consider. Existing research shows that environmental policies and environmental perception both influence individuals' willingness to pay, but prior research has investigated little about the underlying influential mechanism of policies in changing people's psychological perception and related behaviors. The study examines whether environmental perception mediates environmental policies and individuals' willingness to pay. Using survey data from the 2018 and 2021 waves of the Chinese General Social Survey, the study applies a multiple regression approach. The study finds that environmental policies have a significant negative direct effect on willingness to pay, and environmental perception is an important negative mediator in this relationship. These findings contribute to the formulation of policies by integrating policy and individuals' behaviors, suggesting the importance of emphasizing personal responsibility in environmental protection in reality.

Keywords: environmental policy, environmental perception, demographic characteristics, Willingness to pay

1. Introduction

Willingness to pay indicates the highest price a consumer is prepared to spend on a product or a service. In the context of sustainability, it is important to evaluate consumers' willingness to pay for eco-friendly products to assess their awareness of environmental issues and their determination to take environmental action. In recent years, the Chinese government has taken more actions in the governance of environmental issues, issuing and implementing several policies targeted at improving environmental quality, including the Carbon Peaking and Carbon Neutrality goals. However, although China has already established a relatively comprehensive set of environmental policies over the past thirty-five years, some serious environmental problems persist, indicating failures in effective enforcement. As more individuals are prepared to pay more for eco-friendly products, reflecting the growth of ecologically favourable consumer behavior, an important question arises: to what extent do environmental policies affect consumers' willingness to pay for environmentally friendly products? Do policies affect people's perception of environmental problems and therefore influence people's behavior?

The existing research shows that the effects of environmental policies on the behavior of people are entirely different and can be characterized in two ways. One finding suggests that consumer choices are greatly influenced by applicable default rules, so they are promoted to have environmentally preferable actions, suggesting positive effects of environmental policies on individuals' behaviors [1]. Nevertheless, it can also limit some of the free donations made by the citizens to the environment through government intervention, which expresses the adverse impacts [2]. To address this puzzle, the study draws on crowding-out theory, which proposes that government contributions can reduce private voluntary contributions [3]. To be more specific, when the government intervenes in addressing environmental problems, individuals may feel a reduced sense of personal responsibility for environmental protection, which will lead to a decrease in the motivation level to buy an eco-friendly product. The other explanatory factor may be that policies increase the perception of individuals with regard to the pollution thus resulting in an increase in willingness to pay.

In the study, multiple demographic factors are presented as the reasons of the variation in environmental perception and willingness to pay. The willingness to pay is considerably and positively connected with household income [4]. Educational levels also determine the perception of people towards the environment and reaction to policies. The more educated people are more likely to resist change in behavior due to future policies that can lead to the level of environmental quality improvement, than less educated people, as they are more conscious about the environmental problem and have already engaged in environmental protection activities [5]. Age is also a factor that further contributes to the disparity. Older individuals generally report lower levels of environmental concern, and they are less likely to have eco-friendly behaviors to protect it. Perceptions of pollution also affected by location. Rural residents have higher pollution perception than urban residents in China. Based on these pattern, this study integrates macro-level policy and micro-level individual behavior to investigate the mechanism of policy in influencing individual environmental action. In addition, the study also concentrates on individuals' perceptions about environmental issues and investigates the influence pathway of environmental policies on individuals' environmental behaviors, providing an insight into the relationship between consciousness and action.

2. Literature review and theoretical assumptions

The intention of environmental policies is to make the living environment better and to safeguard the ecological systems by controlling and directing the conduct of individuals and companies with laws, regulations, and guidelines. Investigating how these policies influence environmental behavior is important, because such analysis helps determine policy effectiveness and informs improvements that better encourage environmentally friendly behaviors. Environmental policies serve as an effective tool to raise individuals' awareness about environmental issues. With the public opinions being mainly informed by the information available to them, the empirical analysis proves that the policy results in an increased degree of environmental perception, as the public opinions are majorly informed by the most accessible information [6]. Moreover, the perception of the environmental problems also influences the environmental behavior of individuals. Due to the aversion of risk brought by environmental pollution, people who perceive a higher level of environmental risk thus are motivated to make eco-friendly behavior decisions to ensure the environmental quality does not affect living happiness. The review of past studies of the influence of environmental policies on individuals' behavior reveals mixed results. Past studies have drawn on a range of theoretical

perspectives and have reached different conclusions about the effects of environmental policies, including both positive and negative impacts.

Several mechanisms have been proposed to explain the positive effects of environmental policies on behavior. One is the price mechanism. As the carbon tax rate increases, the cost advantage of inexpensive energy sources over more expensive energy has weakened, therefore changing consumers' energy consumption preferences and encourages them to use greener energy [7]. The social norms are also significant in determining the effect of policies on the behavior of individuals, which supports the positive impact of policies further. Studies reveal that social pressures and moral beliefs are motivating factors that guide people to behave and act in a socially acceptable manner, meaning that social norms are an important way of determining pro-environmental behaviour [8]. Not every investigated research, however, demonstrates the positive impact, and there are other studies indicating negative effects of environmental policies on individuals' behavior. There are researches that point to the impact of moral licensing on the decrease of pro-environmental behavior of people. When individuals think that they already have performed environmentally friendly acts, they are less likely to perform spontaneously in environmentally friendly ways, which is an example of a possible negative impact of the government intervention with poor intrinsic motivation [9]. Despite such studies revealing mechanisms of how policies influence behaviour, they disclose two opposite groups of findings. For the research, the study focuses on the crowding-out effect of government intervention, examining how environmental policies influence individuals' environmental perceptions and, in turn, their behaviors in contexts where regulations appear to crowd out other-regarding behavior.

Existing research has already examined the direct influences of environmental policies on people's behaviors; however, most studies do not use mediation models to explain the mechanisms through which policy operates, yet it is essential to understand people's psychological responses to policies to improve policy design and encourage environmentally friendly behaviors more effectively.

Based on the above-mentioned discussion, the study proposes the following two hypotheses:

Hypothesis 1. Environmental policies have a negative influence on individuals' willingness to pay.

Hypothesis 2. The effect of environmental policies on individuals' environmental behaviors is mediated through environmental perception.

3. Research design

The study utilizes data from the 2018 and 2021 waves of the Chinese General Social Survey, which provides nationally representative demographic information on the Chinese population. The study aims to explore the mechanisms through which environmental policies shape people's environmental behaviors. Therefore, the study uses a mediation model in which the policy variable is defined by the release of the "Opinions of the Central Committee of the Communist Party of China and the State Council on Fully and Accurately Implementing the New Development Philosophy and Doing a Good Job in Achieving Carbon Peaking and Carbon Neutrality" in 2021 as the major policy intervention, environmental perception is the mediator, and willingness to pay is the dependent variable [10]. Control variables include demographic factors: location, gender, Hukou, age, education level, and annual income. Table 1 provides the definition and explanation for all variables.

Table 1. Variable definition

Variable type	Variable	Symb ol	Explanation
Dependent Variable	Willingness to Pay	WTP	The highest price a consumer is prepared to spend on an environmentally friendly product, measured in RMB.
Mediator Variable	Environmental Perception	EnvP RO	The perception of severity of air pollution in personal residential areas, where 0 represents the weak perception, and 1 represents the strong perception.
Independent Variable	Environmental Policy	Policy	In 2018, policy is 0; in 2021, policy is 1.
	Location	Locati on	The paper adopts fixed effects to deal with location variables.
	Gender	Gende r	Male is represented by 0, and female is represented by 1.
Control Variable	Hukou	Hukou	Hukou in non-rural areas is represented by 0; Hukou in rural areas is represented by 1.
	Age	Age	The actual age of the respondents (in years).
	Education Level	Edu	Undergraduate and above (higher education level) are represented by 1; others are represented by 0.
	Annual Income	Incom e	Personal annual income, measured by RMB.

As shown in Figure 1, the paper sets the following regression models (1), (2), and (3) to explain the change in willingness to pay and to identify the main influential factors in order to investigate the net effect of the policy:

$$Y = \beta_1 X + \gamma Controls + \varepsilon_1 \quad (1)$$

$$M = \alpha_1 X + \gamma Controls + \varepsilon_2 \quad (2)$$

$$Y = \beta_3 X + \beta_4 M + \gamma Controls + \varepsilon_4 \quad (3)$$

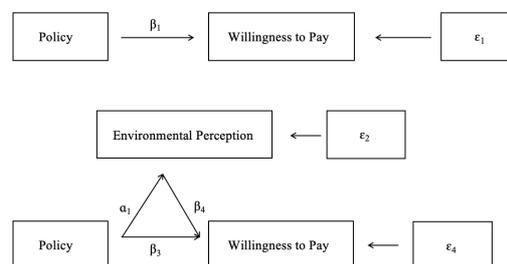


Figure 1. Intermediary effect diagram

4. Empirical research

As shown in Table 2, after controlling for the regional fixed effect, policy significantly reduces individuals' willingness to pay ($\beta = -0.479$, $p < 0.01$). When controlling for individuals' demographic

characteristics, the effect of policy remains stable ($\beta=-0.473$), indicating its robust influence. Among control variables, age has a negative and statistically significant effect on willingness to pay, even though it is small ($\beta=-0.002$, $p<0.05$). Education also negatively affects willingness to pay ($\beta=-0.062$), and gender does not have a significant effect ($\beta=0.030$) either. In conclusion, the results indicate that the mechanism whereby changes in environmental perceptions mediate the effect of environmental policy on willingness to pay appears ineffective. Environmental policy slightly reduces individuals' environmental perceptions, and it is associated with a reduction in willingness to pay.

Table 2. The impact of environmental policy on WTP

	(1) Willingness to Pay	(2) Willingness to Pay
Policy	-0.479*** (-15.570)	-0.473*** (-15.379)
Age		-0.002** (-2.523)
Education		-0.062 (-1.319)
Gender		0.030 (1.114)
Income		0.006*** (3.855)
Hukou		-0.075*** (-2.624)
Constant	3.787*** (140.947)	3.938*** (61.961)
Location FE	Yes	Yes
Obs.	4569	4569
Adj. R ²	0.051	0.058

The section presents the study's findings. As shown in Table 3, first, environmental policy is negatively and statistically significantly associated with environmental perceptions ($\beta=-0.097$, $p<0.01$), suggesting that ecological policy has a negative effect on individuals' awareness of environmental problems. Secondly, in a counterintuitive finding, ecological perception is found to have negative and statistically significant association with willingness to pay ($\beta=-0.097$, $p<0.01$), suggesting that with an increase in environmental pollution awareness, individuals are actually less motivated to pay for environmentally friendly products.

Table 3. The role of environmental perception

	(1) Willingness to Pay	(2) EnvPRO	(3) Willingness to Pay
Policy	-0.465*** (-15.389)	-0.097*** (-3.684)	-0.474*** (-15.621)
EnvPRO			-0.100*** (-2.812)
Controls	Yes	Yes	Yes
Location FE	Yes	Yes	Yes
Obs.	4569	4569	4569
Adj. R ²	0.058	0.056	0.061

Bootstrap

[-0.124,-0.070]

Environmental policy has a direct negative effect on individuals' willingness to pay, which is statistically significant ($\beta=-0.465$, $p<0.01$), indicating that, following the introduction and implementation of the policy, individuals tend to reduce their environmentally friendly behaviors. In addition, the analysis reveals a statistically significant negative indirect effect ($\beta=0.474$, $p<0.01$) of environmental policy on willingness to pay, which is mediated by environmental perception, and the confidence interval [-0.124, -0.070] is in the negative range. This pattern suggests that the hypothesized mechanism whereby environmental policy increases willingness to pay by raising individuals' environmental perceptions may not be effective. Environmental perceptions cannot mediate the effect of policy on willingness to pay, and they even led to lower willingness to pay. With the implementation of environmental policy, people report worse perceptions of environmental pollution, and they still show a low likelihood of increasing their environmentally friendly behaviors.

5. Discussion

This study finds that stricter environmental policy is not necessarily associated with higher willingness to pay, and it even leads to lower willingness to pay by worsening individuals' environmental perceptions. The negative and statistically significant effect that the environmental policy exerts on individuals' environmental behavior is consistent with the crowding-out theory. Government intervention may reduce the role of intrinsic motivation, so individuals are less likely to pay for environmentally friendly products because they assume that the government has taken on the responsibility for environmental protection, or that they have already engaged in sufficient pro-environmental behaviour through compliance with the policy, which reduces their willingness to protect the environment spontaneously.

However, the statistically significant negative effect of environmental policy on willingness to pay via environmental perceptions contradicts the anticipated mechanism. Environmental policy significantly reduces individuals' environmental perceptions, which may be explained by the policy trust effect: individuals believe that government intervention has alleviated environmental problems, thus reducing their subjective perception of pollution severity. In addition, environmental perception also leads to a lower willingness to pay, which may be due to a sense of powerlessness that individuals feel when dealing with deteriorating environmental problems. As a result, with the implementation of environmental policy, people lack motivation to adopt environmentally friendly behaviors due to insufficient realization of their responsibility. The results of the finding imply that the policymakers should strategically inform people about environmental responsibilities and focus on the individual contribution to environmental protection in order not to crowd out the intrinsic motivation when designing policies. As environmental perception reduces people's motivation to pay for eco-friendly products, by providing more factual information about pollution and motivating people to act, policies can attract more voluntary pro-environmental behaviors rather than on the basis of external regulations only.

6. Conclusion

This study uses survey data from the 2018 and 2021 waves of the Chinese General Social Survey to examine whether environmental policy influences willingness to pay through environmental perception. Using multiple regression, the outcome reveals that the environmental policy has a significant and negative relationship with the environmental perception and willing to pay, and this

is contrary to the hypothesis that environmental perception can mediate the negative impact of the crowding-out effect of the environmentally friendly actions, implying the importance of accentuating the responsibility of individuals in implementing the policy. These findings contribute to environmental policy research by the investigation of the psychological mechanisms of government intervention and suggesting directions for more effective policy design, which is to emphasize personal responsibility for environmental protection. However, the study has several limitations. The study is not in a position to rule out reverse causality because the data that is used is cross-sectional in nature. Moreover, the impact of policies and alterations in environmental perception might need a certain time to become noticeable. Further studies can thus apply both panel data and experiments to trace the causal effect more explicitly and can apply longitudinal designs regularly to obtain a more detailed insight into the mechanisms. In addition, the study focuses only on the introduction of environmental policy and does not consider how the policy is communicated or implemented, which may also influence the policy effects on environmental perception. As a result, the study was unable to identify the reasons for the limited effectiveness of environmental policy in raising environmental perceptions.

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