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Do the rich have stronger willingness to pay for environmental protection? New evidence from a survey in China

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ABSTRACT

The majority of existing studies argue that rich people and the residents in high-income countries and regions have stronger willingness to pay (WTP) for environmental protection. Does such a rule hold true for China at the present stage? Previous studies pay little attention to this issue due to the lack of related data. Merging the micro data from the Chinese General Social Survey in 2010 (CGSS2010) with the macro data at the corresponding urban level of China, as well as two types of satellite monitoring data, this paper investigates the effect of income on residents' WTP for environmental protection at both macro and micro perspectives based on the ordered Logit model. The results show that the rich do have stronger WTP for environmental protection. However, with the increase in residents' income, the marginal WTP for environmental protection will decline, and a reversal occurs at the top income level. Therefore, the WTP does not always rise with the increase in income, and the middle-income class has the strongest WTP for environmental protection. Moreover, after controlling individual characteristics, residents' WTP for environmental protection more depends on environmental pollution degree rather than urban average income level measured by both GDP per capita and the nighttime lights data from satellite monitoring. The residents in more polluted cities have stronger WTP for environmental protection. Therefore, it is not reasonable to improve people's environmental preferences purely through economic development.

1. Introduction

According to the data from the World Values Survey[1] (WVS5 and WVS6), 49.7% of 1991 Chinese respondents held that environmental protection should be given priority to economic growth in 2007, even if it could reduce employment and economic growth. This rate climbed to 56.5% (a total of 2300 respondents) during 2012–2013, indicating that the public in China had put a more priority on environmental protection than economic growth. China's economic development has been significantly improved since the reform and opening up in 1978, but environmental quality is not as well-performed as economic growth. If the public are more preference for economic growth and the increase in income at the initial stage of development with a lower income level, then does the increase in income make the public more preferred to environmental protection at the present stage with an upper-middle-income level? Do richer residents have stronger willingness to pay (WTP) for environmental protection? Obviously, under the background of increasingly serious environmental pollution in China, the specific empirical investigation on residents' environmental preference and WTP for environmental protection has a significant meaning of policy reference and practical guiding for the implementation of governmental environmental policy and instruments.

Overall, the influence of income on residents' WTP for environmental protection can be considered from two aspects: one is regional economic development level or macro income level, and the other is residents' individual income level or micro income level. Most existing studies pay more attention to the former and commonly conform to the environmental Kuznets curve (EKC) theory, which suggests that the relationship between environmental degradation and GDP per capita is characterized by an inverted U-shaped curve (Grossman & Krueger, 1995). This means that as per capita income increases, environmental degradation also increases at the initial stage of economic development and will decline after a certain turning point (Stern, 2004). According to the EKC theory, the income level of developed countries is generally over the turning point, and survival needs no longer have to be a top priority in these countries. The public concern more about

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[1] See http://www.worldvaluessurvey.org/wvs.jsp.

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post-materialist values, such as welfare, public service, and environmental concerns, and thus their WTP for environmental protection will continue to rise with the increase in income. On the contrary, in less-developed and developing countries, residents with a lower income level have to remain focused on their survival and material concerns (Inglehart, 1995, 1997).

However, some studies hold that the national income level has no significant effect on residents' WTP for environmental protection, because environmental protection has become a global consensus with increasingly serious global warming and other environmental problems (Dunlap & Mertig, 1995, 1997). Meanwhile, other literatures suggest that residents' WTP for environmental protection is likely to be higher in developing countries due to more serious environmental pollution, and thus there may be a negative relationship between WTP for environmental protection and GDP per capita in developing countries (Dunlap & York, 2008). Therefore, the relationship between the national or regional income level and residents' WTP for environmental protection is still inconclusive.

In addition, some existing studies point that individual income level has a positive effect on his/her environmental concern (e.g., Sun & Zhu, 2014). Individual's consumption of private goods and demand for public goods (such as clean environment) will increase if he/she experiences an increase in income. This means that his/her WTP for environmental protection will strengthen with the increase in income (Kotchen, Boyle, & Leiserowitz, 2013). However, is it certain that the richer residents' WTP for environmental protection is higher than that of the poor? Actually, the WTP for environmental protection of the rich may not be higher, because the rich may be less affected by environmental pollution as they have stronger capacity to avoid pollution damage than the poor. The poor are more likely to be exposed to environmental pollution, and also lack of capacity to avoid pollution damage. Therefore, the poor's WTP for environmental protection may not be lower (Neidell, 2004).

Most of the existing empirical studies are based on the transnational data or survey data from a single region to analyze the effect of the national income level or individual income level on residents' WTP for environmental protection. As the largest developing and the most populous country in the world, the rapid development of China's economy is also accompanied by serious environmental pollution. Meanwhile, there is obvious difference in economic development degree among regions in China. However, previous studies pay little attention to the relationship between residents' income level and their WTP for environmental protection in China.

To fill such a gap, merging the micro data from the Chinese General Social Survey in 2010 (CGSS2010) with the macro data at China's corresponding urban level, this paper employs the ordered Logit model to investigate the effect of income on residents' WTP for environmental protection in China at both macro and micro perspectives. The CGSS2010 data contain the residential addresses of the respondents. This allows us to merge the micro survey data with the urban macro level data. Hence, we can simultaneously examine the influences of individual micro income level and urban macro income level on residents' WTP for environmental protection.

Specifically, the main contributions of this paper can be summarized in three aspects. First, this is the first research to use the ordered Logit model to explore the determinants of residents' WTP for environmental protection in China by matching the nationwide micro survey data with the macro urban level data. Second, we investigate the differentiated effects of diversified micro income levels on residents' WTP for environmental protection in China by dividing the samples into different groups by different individual income levels. Third, we explore the effects of urban macro income level and environmental pollution on residents' WTP for environmental protection under controlling individual characteristics. Furthermore, considering the precision of China's official data, we carry out the robustness test by using the stable nighttime lights data and the annual concentration data of PM2.5 based on satellite monitoring as the proxy variables of urban macro income level and urban air pollution, respectively. This work is expected to provide the empirical evidence for understanding the determinants of the environmental preferences of China's residents, as well as the decision-making reference for environmental protection policies.

The rest of the paper is organized as follows. Section 2 provides relevant literature review and proposes three hypotheses. Section 3 describes the used data, econometric model, and method. Section 4 shows and discusses the empirical results. Section 5 presents some concluding remarks.

2. Literature review and hypotheses

Regarding the effect of micro income level on residents' WTP for environmental protection, most existing literatures suggest that individuals' income is positively related to their WTP (e.g., Sun, Yuan, & Yao, 2016). If we regard environmental protection as a normal commodity, then with the increase of income, the WTP for environmental protection will increase as the budget restriction moves away from the origin. Meanwhile, the rich would also continue to increase the WTP in order to improve their living quality (Franzen & Meyer, 2010). Some studies also find that more educated individuals and the people who pay more attention to environmental pollution have higher WTP for environmental protection, and the rich tend to be more likely to have these characteristics (e.g., Halkos & Matsiori, 2012).

However, whether the rich have higher WTP for environmental protection is still a debatable point (Sun, Yuan, & Xu, 2016). Rich people have more capacity to protect themselves from environmental pollution, because they have the ability to escape the adverse effects of severe environmental pollution by choosing better environment for working and living. Zheng and Kahn (2008) found that house prices were higher in the areas with better environmental condition, and the rich were more inclined to buy real estate in the areas with better environment and higher prices. Moreover, the rich could invest more in self-protection than the poor. Using a unique data set of internet purchases in China, Sun, Kahn, and Zheng (2017) found that households invested more in masks and air filter products when ambient pollution levels exceeded key alert thresholds. However, the rich were more likely to invest in air filters which were more expensive than masks. This means that the poor are more affected by environmental pollution. Compared with the poor, the rich could protect themselves more efficiently through private markets when facing environmental pollution. Therefore, after a certain degree of environmental protection investment in private markets, the rich's WTP for environmental protection may be diminishing.

There is no dispute about the serious harm of environmental pollution to residents' health (e.g., Ebenstein et al., 2015). However, it is worth noting that the adverse impact of environmental pollution on residents' health is not homogeneous as the income levels of individuals are different. Compared with the rich, the poor are more likely to be exposed to environmental pollution, and this may increase the poor's medical expenses and the loss of human capital (Neidell, 2004). Consequently, the adverse effects of environmental pollution on the poor are more serious (Sun & Gu,