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China Based on the Latest Three Waves of the World  
Values Survey

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# A Study on Environmental Concern in Mainland China Based on the Latest Three Waves of the World Values Survey

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## Abstract

This study uses Waves 5, 6, and 7 of the transnational survey database World Values Survey to empirically investigate the relationships between environmental concern and a set of demographic variables relevant to the postmaterialist thesis, namely (1) age, (2) education, (3) income, and (4) urbanization in Mainland China. Responses on (1) prioritizing environmental protection versus economic growth and (2) activeness in environmental organizations are chosen to represent environmental concern. This study employs a two-step approach, conducting both separate regressions for each wave and an aggregated regression combining all three waves. Descriptive statistics show an increasing trend in prioritizing environmental protection over economic growth, but membership in environmental organizations remains consistently low across the three waves. Regression results indicate that age and education are better “predictors” of environmental concern than the other demographic variables; in other words, the “socialization hypotheses” appear to hold more strongly than the “scarcity hypotheses” in Mainland China, a “natural laboratory” with large demographic variations and a “Confucian” background. Large inconsistencies exist in how demographic variables perform by question item and wave, and between the separate and aggregated regressions, highlighting the relevance of the “Asian uniqueness” argument. Those expressing positive attitudes toward postmaterialist topics, such as environmental protection, in Mainland China can have very diverse backgrounds. To further elaborate on the “Asian uniqueness” argument, other societies in the Greater China area and East Asia can be compared. To address limitations in survey design and sample quality, and to provide qualitative explanations and further insights into other aspects of environmentalism, additional methods such as survey experiments, text analysis, interviews, and fieldwork can be incorporated.

**Keywords:** Environmental Values, World Values Survey, Mainland China

## **Using World Values Survey**

I use Waves 5, 6, and 7 of the World Values Survey (WVS), which were conducted around every five years from 2005 to 2022, to investigate concern toward environmental protection and pollution in Mainland China. I see environmental concern as a relevant “component” in Inglehart (1997)’s postmaterialist framework that is worth exploring. Inglehart (1995) and Diekmann and Franzen (1999) investigate national wealth represented by GNP per capita and environmental values across a large set of nations and show that they are highly correlated. I look at individual-level demographics such as age, income, and education as independent variables, which have been commonly used to explain environmental support, such as Gelissen (2007), and I put Inglehart’s theory in a local context and use environmental concern to shed light on the applicability of the “scarcity hypothesis” and “socialization hypothesis” in Mainland China.

The WVS is used here because (1) it contains question items to choose from that ask about the willingness to care and take action for the environment, and the Asian Barometer does not include such questions; (2) some of the questions refer to the trade-offs between economic concerns and environmental concerns, e.g., contribution to environmental organizations, tax increase for the environment (personal actions), environment vs. economic growth (general concern), where one is related to materialist orientations and the other is about postmaterialist orientations. These questions seem to be suitable for use under the postmaterialist framework. I focus on Mainland China as it seems to be a good case study because it (1) has a “Confucian” context, (2) has a large socio-economic and regional span, making it a “natural laboratory” to test the postmaterialist model and shed light on the “Asian uniqueness” argument.

## **Conceptualization**

While some questions in the WVS are about willingness for (Wave 5) or historical record of (Wave 6) personal environmental action, i.e., environmental tendency/action, some are about broad economic vs. environmental preference, i.e., environmental attention/awareness, and are about general desire for society in general, i.e., societal desire. Although both can represent environmental concern, they may be on different spatial levels. To put it differently, environmental attitudes and environmental commitment to movements can be seen as different dimensions of environmentalism (Cluck et al., 2003), and I do not discuss or analyze the translation between them here.

Question items on different levels are used, and they are combined into an “environmental concern index.” I note that to what extent environmental awareness itself is on the “self-expression” side rather than the “survival” side in the postmaterialist thesis can be debatable, because some environmental awareness is closely related to personal survival and health, such as air and water pollution in the neighborhood, but some is related to broader aesthetic needs, such as beautiful nature, habitats for animals, and biological diversity. In other words, some are more personal, and some are more impersonal.

“Environment” can be a vague concept, which is susceptible to personal interpretation. For example, questions in the survey do not distinguish between geographical levels for the respondents’ concern for the “environment.” While a question on whether a person belongs to or donates to an “environmental” organization is asked, we do not know whether the organization is about protecting the local, national, or global environment. Concern for the environment can be on different geographical levels, e.g., one’s close neighborhood, one’s city, one’s province, one’s country, and the world as a whole, and they can carry different meanings. While the latter ones seem more postmaterialist and even cosmopolitan, the former ones seem more materialist. If one only cares about the environment in one’s own country over the global environment, then although such distinction is not reflected in the survey questions, there can be a nationalist element in such “local” or “national” postmaterialism, and this makes investigating the relationship between nationalist sentiment and environmental concern another interesting research topic.

An extreme example is that if a government-backed or publicly funded project aims to produce eco-friendly equipment and machinery, such as solar panels and wind turbines that create renewable energy, and if such factories or research centers are located in certain neighborhoods, local residents may also protest against such endeavors in the name of protecting their own neighborhood’s environments. Even though in the long term, the project may be beneficial to the environmental friendliness of the whole nation, the residents may think that in the short term, it may harm the local environment, whether such thinking is conspiratorial or has a scientific basis or not. Therefore, such environmental protest may actually be about a divide between local/national environmental protection and short-term/long-term environmental protection and reflect personal and family interests more than national and cosmopolitan concerns. Therefore, there are diverse motives and forms for environmental values.

### **Types of Research**

Some studies, such as Contorno (2012), investigate the relationships between different values and show that compared to postmaterialism itself, cosmopolitan/patriotic values seem to be more correlated with environmental values. Other examples include those that construct indices that make a distinction between proself and prosocial values and investigate their correlations with environmental values, such as Garling et al. (2003), which looks at car owners in Sweden. They all somewhat assume that values have important influences on people’s reception and behaviors regarding environmental topics (Douglas et al., 1998). However, this analysis does not use cosmopolitan or other values as independent variables and focuses on socio-demographic variables as independent variables. Also, although it is interesting to look at the relationship between political ideological orientation, party affiliation, and perhaps nationalist sentiments and environmental values, Mainland China is a one-party system, and it is difficult to define and measure the left-right orientations. Perhaps the libertarian/authoritarian values are easier to apply than the left/right division. I do note that it is possible to include party membership in the Chinese Communist Party (CCP) as a control variable in the regression model, but this is not included in the WVS.

Looking at the master questionnaires for the three waves of the WVS, they do not have the same set of questions about awareness toward environment and pollution, and they may not ask the same topics in the same way, and the corresponding response categories can also be different. For example, while Wave 5 asks whether the respondent would give part of income for the environment (Likert scale of 4 levels: Strongly Agree/Agree/Disagree/Strongly Disagree), i.e., environmental tendency, Wave 6 asks whether the respondent has donated to an ecological organization in the past two years (a dichotomous Yes/No), i.e., environmental action. The former asks what one would do, whereas the latter asks what one has done. Putting aside “social desirability bias,” the latter seems to employ a stricter standard for environmental awareness. In some cases, questions and responses are the same, such as for membership of environmental organization (Active/Inactive/Not Belong). Also, while Waves 5, 6, and 7 ask about membership in an environmental organization, and Wave 7 asks about whether one has participated in an environmental demonstration, they do not ask about attending meetings and petitions like Wave 3 does.

Thinking that people should give money to an environmental organization or expressing willingness to do so, as asked in Wave 5, is different from having actually made a donation, as asked in Wave 6. The former is a tendency, and the latter is a finished action. Similarly, thinking that the government should take action to protect the environment is different from having actually joined demonstrations to urge the government to take action, which is asked in Wave 6, as the former can be about the potential to participate, and the latter is about past participation. This gap can be considerable in an authoritarian regime with high political and economic risks of being arrested or disadvantaged in various ways for joining a demonstration.

I note that the latest waves have somehow reduced the number of questions on environmental action, especially those about daily actions to protect the environment, compared to earlier waves. For example, in Wave 3, responses to the following questions are sought: “choose products that are better for the environment,” “recycle something rather than throw it away,” “reduce water consumption for environmental reasons,” and “attend meetings, sign petitions aimed at protecting the environment.” Compared to Waves 5, 6, and 7, these questions are perhaps more detailed on personal and civic environmental actions and are related to specific environmental issues rather than broad environmental concern, such as recycling, water consumption, and eco-products. I note that there are studies such as Engel and Potschke (2012) that follow the behavioral science stream and specifically analyze economic behaviors such as willingness to pay higher prices, taxes, and sacrifice or cuts in the standard of living. I note that in previous waves, some questions ask about money, such as contributing to environmental organizations or being willing to pay more taxes for environmental causes, and money is an important proxy for survival in the original postmaterialist framework, but because not all waves have these questions available for longitudinal comparison, this is not included. Regarding the positioning of this analysis in the literature: (1) on the independent variables side, I do not look at other indices of values, such as cosmopolitan, postmaterialist, libertarian, or authoritarian values, or left-right orientations; (2) on the dependent variables side, I do not look at economic behaviors such as consumption, donation, or willingness to pay; (3) I also do not

look at how environmental concern translates into environmental movements such as protests.

### **Question Items**

To start with, Wave 5 includes the following five question items: (1) Active/inactive membership in an environmental organization, (2) question on protecting the environment vs. economic growth, (3) give part of your income for the environment, (4) increase taxes if the extra money is used to protect the environment, and (5) government should reduce environmental pollution. Wave 6 includes the following question items: (1) Active/inactive membership in an environmental organization, (2) protecting environment vs. economic growth, (3) given money to an ecological organization in the past two years, and (4) participated in a demonstration for the environment in the past two years. Wave 7 includes the following question items: (1) Active/inactive membership in an environmental organization and (2) protecting environment vs. economic growth. We can see that the following two question items—(1) question on protecting environment vs. economic growth and (2) active/inactive membership in an environmental organization—are in place for all three waves in the Greater China area. The response categories for the latter include: (1) Active, (2) Inactive, and (3) Not Belong.

I note that the three response categories can be insufficient to capture the respondents' self-identification, i.e., some may feel that while they belong to an environmental organization, they are neither active nor inactive and are somewhere in between. Whether self-identified as active or inactive can be rather personal, as no specific questions on the number of events participated in, how much time was spent, or how much money was donated are asked here. Also, differences in cognitive capabilities and forms can exist across individuals as well as across cultural groupings, and there can be personal and cultural differences in the distances between the Likert-scale categories, such as "active" and "inactive," given the personal experiences and pre-existing scale and support of environmental movements for Q2 in the society. This is a common problem related to subjective standards for self-reports.

The exact question for the former question item is: "Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view?" The response categories include: (1) Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs; (2) Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent; and (3) Other. We can see that the former is about "environmental action," i.e., historical record, and the latter is about "environmental awareness," i.e., societal desire in general. Although both seem to reflect environmental concern, the former is about preference on a personal level, and the latter is about preference on a societal level.

Also, due to the small number of questions on environmentalism in Wave 7, to compare across and combine the three waves and look at recent trends, questions on giving/having contributed money, i.e., environmental tendency or action, and on whether one participated

in a demonstration, i.e., environmental action, and questions on attitude toward taxation for environmental policy and on desire for government action, i.e., environmental awareness, which only appear in one or two waves, need to be put aside in the analysis. Therefore, these two questions are selected for the separate and combined regressions and the making of the index. The “environmental concern index” includes questions of different levels on both environmental action and environmental awareness. Furthermore, social desirability bias may exist, meaning that the responses may lie or exaggerate their priority of environmental protection and membership in environmental organizations, but this is difficult to avoid considering this type of question and using an existing survey database.

## **Demographic Variables**

Demographic variables that are considered most relevant to the “socialization hypothesis” and “scarcity hypothesis,” including (1) age, (2) income, (3) education, and (4) urbanization, are the independent variables. The two question items on environmental action and awareness shared by the three waves are the dependent variables. The question on protecting environment vs. economic growth is coded Q1, and the question on active/inactive membership in an environmental organization is coded Q2 in the regression tables. For both questions, while in occasional cases, values of -1 (Don’t know), -2 (No answer), -4 (Not asked), and -5 (Missing or Unknown) appear in the responses, they are not included in the regressions. I note that the independent variable education here only refers to the level or length of education rather than its content or style. I note that the degree and way emphasis on environmental pollution and its social impacts, such as existing environmental policies on national and local levels in one’s own society and teaching and discussion about environmental policies and standards in other countries and globally, as well as daily emphasis on what individuals can do to help reduce the pollution, such as the 3Rs, can naturally have implications on the students’ environmental concern.

Regarding income, I choose the ten quantiles for Waves 5 and 6 and the three quantiles (1) Lower, (2) Middle, (3) Higher for Wave 7. Regarding age, it is measured in number of years for all three waves. Regarding education, I use the nine levels from no formal education to university level with degree for Waves 5 and 6, and three categories (1) Lower, (2) Middle, (3) Higher for Wave 7. For Wave 7, there is a specific code for the case of Mainland China on urbanization, which has two response categories: (1) Urban and (2) Rural. For Waves 5 and 6, there is no such coding, but there is a question on whether the respondent has an agricultural/non-agricultural residential status (or “hukou” in Chinese) for Mainland China. Because those registering an agricultural hukou can also work and live in urban areas, and vice versa, and this does not necessarily reflect the level of urbanization of the respondents’ region of residence and can make it difficult for comparison with Wave 7, I do not include urban/rural in the descriptive statistics and regressions for Waves 5 and 6. For Wave 7, Urban is coded as 1, and Rural is coded as 2. Regarding Q1 and Q2, the question wording and response categories are the same for all three waves.

I provide a summary of the names and categories of all the variables used in this analysis for each wave (each wave has a different labeling and coding system) in the Appendix. The

original naming and coding rules of the variables can be found in the master questionnaires and codebooks of the WVS for each wave shown on its official website. Also, their localized versions in specific languages can be found on its sub-websites. I mostly follow the original coding except for some cases where simplifications are needed for regressions, such as combining categories for marital status as a control variable. Any variable, whether dependent or independent, that has null answers such as “No Answer,” “Not Asked,” “Do Not Know,” and “Missing” is not included in the regressions.

## Control Variables

Two demographic variables, (1) gender and (2) marital status, are included here as control variables, and they are treated as dichotomous rather than continuous variables. Male is coded as 1, Female is coded as 2; Married is coded as 1, and Non-Married is coded as 2. In the case of marital status, although response categories of (1) Married, (2) Living together as married, (3) Divorced, (4) Separated, (5) Widowed, and (6) Single are included in the WVS in all three waves, for convenience, only two response categories, Married and Non-Married, are used in this analysis. I combine (1) and (2) as Married and all the rest as Non-Married. I note that other ways to combine exist, but the way I combine focuses on the present status. I also note that the number of times the respondent has been married can also be a control variable, but this is a very rare case.

It is possible that the respondents’ attitudes toward environment and pollution could have some kind of relationship with the number of children in the household or having or not having kids, but such a possible relationship is not included here for convenience. Other variables, such as ethnicity, religion or religious denomination, and religiosity of the respondent, education and income of the respondent’s parents, and GDP per capita in the region, which indicates the stage of the economy, can also be included as control variables. In the case of ethnicity, since Han makes up the majority of the population, it can be ignored, although a dichotomous Han/Non-Han variable could be made. In the case of religion and religiosity, since Mainland China shows a variety of folk religions rather than formal and established religions (Zhang and Lu, 2020), using a formal denomination division such as Christian/non-Christian may not be a good idea.

I make empirical analyses with the survey data in three steps: (1) I summarize the responses of the two questions of each category in percentages for the three waves; (2) I summarize the descriptive statistics of the question items, demographic variables, and control variables for the three waves; (3) I make regressions with these variables for the three waves. Figure 1 shows the percentage responses across the three waves, including null answers, for Mainland China. Figure 2 shows the descriptive statistics of the question items and demographic variables for Mainland China, including the sample sizes, or the number of observations, after deducting all the null values such as “No Answer” and “Do Not Know,” which are coded as negative values in the original datasets for all the waves (although those null answers can have different categories and coding for each wave). All the data are processed, and all the tables and graphs are made with the programming software STATA.

## Descriptive Statistics

The sample sizes, after deducting all the null answers, for Waves 5, 6, and 7 are 1,192, 1,723, and 2,934, which increase over time, perhaps increasing sample validity. In Figure 1, (1) we can see from the distribution of Q1 that, for Wave 5, only around 22% of the respondents tend to prioritize environmental protection over economic growth. For Wave 6, this figure goes to around 27%, and for Wave 7, this figure goes to 68%, surpassing those prioritizing economic growth, showing a longitudinal increase across the three waves. I note that, although not included in the regressions, some respondents answer “Other” for Q1, which amounts to around 5% for Wave 5, 2% for Wave 6, and 5% for Wave 7. (2) We can also see from the distribution of Q2 that a majority of the respondents do not belong to any environmental organizations, which is around 92% for Wave 5, 97% for Wave 6, and 95% for Wave 7. In other words, members of environmental organizations remain in the minority in Mainland China. Also, we do not see an increasing trend for the percentage of active members or a decreasing trend for the percentage of inactive members across the three waves. Actually, the percentage of active members slightly decreases from Wave 5 to 6, and inactive members slightly increase from Wave 6 to 7. In other words, we somewhat see a gap between environmental awareness represented by Q1 and environmental action represented by Q2, and environmental awareness does not seem to have translated into environmental actions in the three waves.

To visually show the longitudinal changes of the responses in percentages across the three waves, I summarize them into two line plots, one for Q1 and one for Q2, and I omit the null answers, shown in Graph 1. Comparing the two line plots, we can see that for Q1, there are longitudinal changes representing an increase in environmental concern across the three waves, but for Q2, we do not see much of a trend, with most of the responses concentrating on no membership across the three waves. Even for Q1, the increase does not seem very obvious. I note that I do not focus on longitudinal changes of the responses to Q1 and Q2 in my hypotheses, but I focus on the correlations between them and the demographic indicators as well as the cross-wave differences. In Figure 2, we can see the descriptive statistics of all the demographic variables, and for the three waves in this analysis, age, education, and income have quite a large distribution. Compared to Q1 and Q2, we do not see large concentrations on one side in the distribution for the demographic indicators. We can see that both males and females make up the sample, and there is no concentration on one gender for all three waves.

## Postmaterialist Hypotheses

I conduct regressions for the two questions with the four demographic variables, and gender and marital status are included as control variables. Most variables, except for age in Wave 7, are not continuous and have a small number of intervals, such as low, middle, and high. Q1 and Q2 in the regression tables represent the two questions that ask about environmental protection/economic growth and environmental organization membership. Q3 is a combination of Q1 and Q2 and can be named the “attitude to environmentalism index.” This index is calculated as a mean and is derived from addition. This index is added

to provide some insight into the general image of the relationship between the demographics and environmental concern for the respondents. I note that since for Q1, 1 means prioritizing the environment, and 2 means prioritizing the economy, which is different from Q2, where larger numbers indicate more active membership, I switch the codes of 1 and 2 in the case of Q1 in the regressions to match Q2. Figure 3 shows the results of the regressions for Mainland China.

I inspect two aspects of the regression results, including (1) the direction of correlation represented by the presence of the negative sign, and (2) statistical significance represented by the presence and number of asterisks in the regression tables. Originally, Inglehart (1995) and Diekmann and Franzen (1999)'s analyses of environmental values primarily focus on datasets across a large range of nations and find a high correlation between national wealth and environmental values, i.e., the scarcity hypothesis. However, in my analysis, I primarily focus on individual traits such as age, income, and education, and the only contextual factor I consider is the level of urbanization. I focus on both the socialization and scarcity hypotheses.

I hypothesize that (1) Age is negatively associated with environmental concern, i.e., older generations have less environmental concern. (2) Household income is positively associated with environmental concern, i.e., richer households should show more environmental concern. (3) Education is positively associated with environmental concern, i.e., respondents who received more education should show more environmental concern. (4) Urbanization is positively associated with environmental concern, i.e., those in urban areas rather than rural areas should show more environmental concern. For the responses to Q1, prioritizing the environment is coded as 1, and prioritizing economic growth is coded as 2 in the regressions. I note that, different from the rest of the demographic variables, age should show negative signs in the regression tables. Based on the postmaterialist thesis, hypotheses (1) on age and (3) on education are more about the "socialization hypothesis," and (2) and (4) on household income and urbanization (economic indicators for individual and regional levels) are more about the "scarcity hypothesis." Therefore, there are four main hypotheses that I would like to test in the postmaterialist thesis.

## **Regression Results**

In Figure 3, we can see from the regression results of Wave 5 that (1) Age conforms to the expected direction of correlation compared to the hypothesis for Q1, Q2, and the overall index. As we hypothesize that older generations should show less environmental concern, the expected direction should be negative. For Q2 and the overall index, age carries statistical significance. (2) Education does not conform to the expected direction for Q1, but it conforms to the expected direction for both Q2 and the overall index, and it carries statistical significance for Q2 and the overall index. (3) Income conforms to the expected direction for all question items and the overall index, and it carries statistical significance for Q2 and the index. Also, if we look at the two control variables, it is noticeable that marital status seems to correlate positively with Q2 with statistical significance, meaning that those not married tend to have more active membership in environmental

organizations. To sum up, compared to Q1, Q2 and the overall index show more cases of both conforming to the expected direction and carrying statistical significance for the demographic variables. In other words, the selected demographic variables seem to “predict” the activeness in membership in environmental organizations better than whether prioritizing environmental protection over economic growth. Looking at Q1, demographic variables such as age and education do not conform to the expected directions. We can see that income seems to be the best performer as it shows the expected direction for all question items and the overall index, as well as having the largest number of asterisks indicating statistical significance for the overall index. In other words, if we look at Wave 5, the scarcity hypothesis with regard to income seems to work well, and while the socialization hypotheses with regard to age and education do not seem to work well for Q1, they do for Q2 and the overall index.

We can see from the regression results of Wave 6 that (1) Age has the opposite direction compared to the hypothesis for Q1 and the overall index with statistical significance, which is an unexpected result. Also, age conforms to the expected direction for Q2 but without statistical significance. (2) Education shows the expected direction of correlation for both question items and the overall index and carries statistical significance. These results support the socialization hypothesis in the postmaterialist thesis with regard to education. (3) Income shows the expected direction for Q2 but not Q1, and for both question items, it does not carry statistical significance. If we look at the overall index, income does not seem to show any correlation. Also, if we look at the two control variables, similar to Wave 5, marital status seems noticeable as it seems to negatively correlate with Q1, Q2, and the overall index with statistical significance, showing that those married tend to engage more in environmental organizations. To sum up, we see that education seems to be the only good “predictor” for environmental concern as it conforms to the expected direction of correlation and carries statistical significance for the questions and the index. If we look at the overall index, age shows the opposite direction as expected, and income shows no correlation at all. Therefore, the socialization hypothesis with regard to education is supported, but it is not supported with regard to age, and the scarcity hypothesis with regard to income is not supported. The poor performance of income here is in contrast with Wave 5.

We can see for Wave 7 that (1) Age does not conform to the expected direction, and there is no statistical significance. (2) Education conforms to the expected direction and carries statistical significance for both question items and the overall index. This is similar to the result of Wave 6 mentioned above. (3) While income conforms to the expected direction for Q1 and the overall index, it does not for Q2, and there is no statistical significance. (4) Urban/rural conforms to the expected direction for both question items and the overall index. Since we hypothesize that rural areas show less environmental concern, and urban is coded as 1 and rural as 2, the expected direction should be negative. Also, it does not carry statistical significance for both question items and the overall index. If we look at the control variables, it is noticeable that gender seems to be negatively correlated with Q1 with statistical significance, meaning that males seem to care more about the environment than the economy. To sum up, we see that in Wave 7, again, only education is a good “predictor” for both question items and the overall index, which conforms to the expected direction and carries statistical significance. Urbanization shows the expected direction but

does not carry statistical significance for the overall index. Also, the low R-squared values may imply that despite incorporating gender and marital status as control variables, there may be other relevant explanatory variables other than age, education, and income that are not included in the existing model. Only the socialization hypothesis with regard to education is supported, and the scarcity hypotheses with regard to income and urbanization are not supported.

Looking at the three latest waves in the WVS for Mainland China, we can see that (1) While income seems to be the best performer for Wave 5, it is not for Waves 6 and 7. In other words, the scarcity hypothesis with regard to income only holds for Wave 5. (2) Education continues to be a good performer for all three waves, and if we look at the overall index, education shows the expected direction and strong statistical significance, indicating that the socialization hypothesis with regard to education works well for Mainland China based on the three latest waves. (3) Age and income do not often work in the expected directions and carry statistical significance across the questions and waves. Income only works well for Wave 5 but not Waves 6 and 7. To conclude, using the latest three waves and looking at Mainland China, different demographic variables perform differently across the question items, overall index, and waves. While education seems to be a more consistent performer, income and age are not. Income only seems to work well for the question items and the overall index for Wave 5, and in some cases, age and income show no correlations or opposite directions compared to the expected hypotheses, so their effects seem to be inconsistent across question items and waves. Therefore, the “socialization hypothesis” and “scarcity hypothesis” perhaps should not be seen as two objects but four, and while the socialization hypothesis based on education seems to apply well to Mainland China, the socialization hypothesis based on age does not apply as well. Also, the scarcity hypothesis based on income does not seem to apply well to Mainland China, and the scarcity hypothesis based on urbanization does not seem to apply well either for Wave 7.

### **Aggregating Three Waves**

To have a general picture of the regression results of Mainland China during the three waves as a whole, I conduct another regression with the two question items and the overall index and the same set of demographic variables, except for urbanization, which is not included in the regressions for Waves 5 and 6. Figure 4 shows the aggregated regression results for Mainland China combining the three waves. We can see that if we omit longitudinal differences across the waves, age seems to conform to the expected direction and carries statistical significance for the two questions as well as the overall index, and while education conforms to the expected direction and carries statistical significance for Q2, it does not conform to the expected direction for Q1 and the overall index. Strangely, it shows the opposite direction compared to the expected but carries statistical significance for Q1 and the overall index. Also, income does not conform to the expected direction for Q1, and while it does for Q2, it does not carry statistical significance. Strangely, it also shows the opposite direction compared to the expected but carries statistical significance for Q1 and the overall index.

Again, we can see from the aggregated regression results that the three demographic variables do not seem to have consistent effects across the question items and the overall index, with one interesting point: compared to previously looking at the three waves separately, age in the aggregated regression here seems to be a good performer for the two question items, supporting the socialization hypothesis with regard to age. However, different from the separate regressions, education no longer seems to be a good performer, as it shows opposite effects compared to the expected for Q1 and the overall index. Income again does not seem to be a good performer due to its opposite effects for Q1 and the overall index. In other words, only the socialization hypothesis with regard to age is supported, and the socialization hypothesis with regard to education and the scarcity hypothesis with regard to income are not supported.

Furthermore, if we look at the two control variables, we can notice that gender seems to be negatively correlated with Q1 and the overall index with statistical significance, which is similar to what is observed in Wave 7. For Q2, while gender does not seem to correlate with Q2 at all, marital status does correlate with Q2 with statistical significance. Looking at marital status, the positive correlations with statistical significance of marital status with Q1, Q2, and the overall index are similar to the positive correlation observed in Wave 5 but different from the negative correlations observed in Wave 6 separately. Looking at the overall index, it shows that males seem to be more supportive of environmentalism, and those married seem to be more supportive of environmentalism, if we do not consider any gender differences in social desirability effects. Discussions on why the two control variables seem to correlate with Q1 and the overall index, and why marital status correlates with Q2 but not Q1 in the aggregated regressions, are beyond the scope of this analysis.

## **Conclusion and Discussion**

The descriptive statistics show that there is an increasing trend in prioritizing environmental protection over economic growth, but membership in environmental organizations is consistently low across the three waves. The regression results show that discrepancies exist in the performance of demographic variables across question items and waves, and between the separate and combined regressions. Citizens in Mainland China with environmental values and membership in environmental organizations have very diverse demographic backgrounds. This suggests that the “Asian uniqueness” argument is present in the case of Mainland China and raises questions about potential limitations in the regression models and even problems associated with the samples themselves. A number of points can be discussed beyond the regression results here.

First, to elaborate more on the “Asian uniqueness” argument, the results can be compared to other societies in the Greater China area, including Hong Kong and Taiwan, as well as other East Asian societies such as Japan and South Korea, which are seen as sharing a “Confucian” context, to see if the “socialization hypotheses” also perform better than the “scarcity hypotheses.” We can also compare with some developing and underdeveloped societies, such as those in Southeast Asia, Africa, and Latin America, to examine their

conformity to the postmaterialist hypotheses. One example of environmental studies focusing on underdeveloped regions is Yogo (2011), which looks at Africa and incorporates the social capital concept, including information and peer effects, in analyzing willingness to pay. Other examples that discuss environmental policies and public sentiments include Bhattacharyya (2007), which looks at South Asia, and Albizua and Zografos (2014), which look at Spain. However, such global comparisons are beyond the scope of this analysis.

Second, problems exist in how questions are asked and how response categories are designed in the two WVS questions on environmental concern, as well as in sample quality. A number of other questions on environmental concern, at different spatial levels, are necessary for a more detailed discussion, such as questions that distinguish environmental concern for one's own neighborhood versus environmental concern for the diversity of animals and the beauty of nature, but the WVS does not include these questions. One possible solution is to use domestic databases in local languages. To provide answers to more specific questions targeting different spatial levels and ensuring higher sample quality, it is also possible to conduct original or tailored survey experiments with prior ethical approval, although this would be more costly and time-consuming. Limitations in survey design and sample quality in existing survey projects call for incorporating other empirical research, such as text analysis and social media data (e.g., Weibo), as well as qualitative research using interviews and fieldwork.

Also, I take the survey results at face value, but a common question about survey analysis is to what degree biases, such as the "social desirability bias," exist and how the size of such bias differs across the societies being compared. The size of such bias can only be assessed by manipulating different questions for the same respondents on a topic. Differences in cognitive capabilities and forms can exist across individuals as well as across cultural groupings. Different cultural settings can make respondents perceive questions and response categories, including wording and translated wording, in slightly different ways. Respondents across societies may have different understandings of the word "environmentalism" itself, and there may not be universal agreement on its definition, but such nuance can be ignored. Additionally, there can be personal and cultural differences in the distances between Likert-scale categories, such as "active" and "inactive," given personal experiences and pre-existing scale and support of environmental movements for Q2 in the society; e.g., those who consider themselves actively participating in Mainland China may not be seen as participating enough by those in Hong Kong, making comparisons difficult, which is a common problem related to subjective standards for self-reports.

Fourth, the regression models can be improved by introducing more control variables. Some examples include the number of children, number of siblings, and respondents' parents' education and income (which can also be seen as part of the socialization hypotheses), party membership in the CCP, which may influence members to have similar attitudes toward environmental policies as the CCP and its top leaders, as well as some subjective rather than objective indicators such as life satisfaction, which is short-term and can capture some current conditions of the respondents and period effects. Macro factors such as economic

levels, growth, inflation, inequality, and exogenous factors capturing life-cycle effects—such as media coverage on environmental issues, movements of domestic and international NGOs and NPOs on environmental issues, civic environmental protests and government reactions, as well as COVID-19 policies (given that the COVID-19 pandemic occurred during Wave 7)—can also be included. I assume independent effects between Q1 and Q2 in the regressions, but there may be interaction effects that can be considered. Additionally, the concentration of non-membership for Q2 and low variation can undermine the regression results for Q2. To increase variation, the WVS can be combined with data on similar questions from other relevant survey databases or original and tailored surveys.

Would regression results change if we use or combine with other samples with similar question items? Would the regression results change if we incorporate other control variables? Do the inconsistencies found in this analysis indicate “Asian uniqueness,” or do they simply reflect sample bias? Or is the postmaterialist thesis itself inadequate? There are perhaps three possibilities: (1) there is “Asian uniqueness,” as this analysis suggests; (2) there is no “Asian uniqueness” if we use or combine with other samples; and (3) the postmaterialist thesis is not robust. It is not possible to address (2) and (3) without referring to other samples and research methods and comparing them to a larger set of societies. Furthermore, “age” in the regression model may not necessarily reflect only generational replacement and formative preadult experiences; it may also capture post-adult and more recent life-cycle and period effects, such as environmental movements, events, media coverage, and government reactions, which may not be as relevant to the socialization hypothesis in the original postmaterialist framework focusing on generational replacement.

Lastly, while regression results are discussed, qualitative explanations on why education generally seems to perform better than other demographic indicators, why income only performs well in Wave 5 but not others, why discrepancies in the direction of correlations across question items and waves exist, why in the aggregated regression with combined waves only age performs well (different from the separate regressions), why education performs well in individual waves but not in aggregated waves, and why gender and marital status sometimes have different effects for the question items, should be given more attention. The idea that environmental concern is held back by “Confucianism” is not a sufficient explanation, because it is a package of vague, dynamic, multifaceted, and even contradictory doctrines that have changed over time and differ across Asian societies. While it can be said that those with “Confucian values” should care about nature, it can also be said that those with Confucian values may not prefer movements and protests that destabilize society or oppose existing hierarchical governance. Perhaps whether people with Confucian values express positive attitudes toward environmental protection depends on whether the protection is driven by bottom-up civic movements or top-down policies from authorities. It is difficult to empirically test the relationship between Confucian values and environmental values because there is no single document outlining its doctrines, such as the Bible in Christianity, which can be used to measure biblical literalism. People also interpret Confucian values differently due to the complexity of its doctrines, so they may respond subjectively regarding the extent to which they are Confucian. There is also no agreement on which specific religious activities constitute Confucianism, unlike attending

church in Christianity, which can be used to measure religiosity, given the diverse folk religions and practices in the Greater China area. Macro factors and historical background, such as modernization and democratization trajectories, as well as period effects such as environmental movements and policies, could also be considered and perhaps compared with other regions in the Greater China area and East Asia.

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## Tables and Graphs

Wave 5

Q1	Freq.	Percent	Cum.
No Answer	12	0.6	0.6
Don't Know	446	22.4	23
Protect Environment	447	22.45	95.18

Economic Growth	990	49.72	72.73
Other Answer	96	4.82	100
<b>Q2</b>	<b>Freq.</b>	<b>Percent</b>	<b>Cum.</b>
No Answer	23	1.16	1.16
Don't Know	3	0.15	1.31
Don't Belong	1,832	92.01	93.32
Inactive Member	97	4.87	98.19
Active Member	36	1.81	100

Wave 6

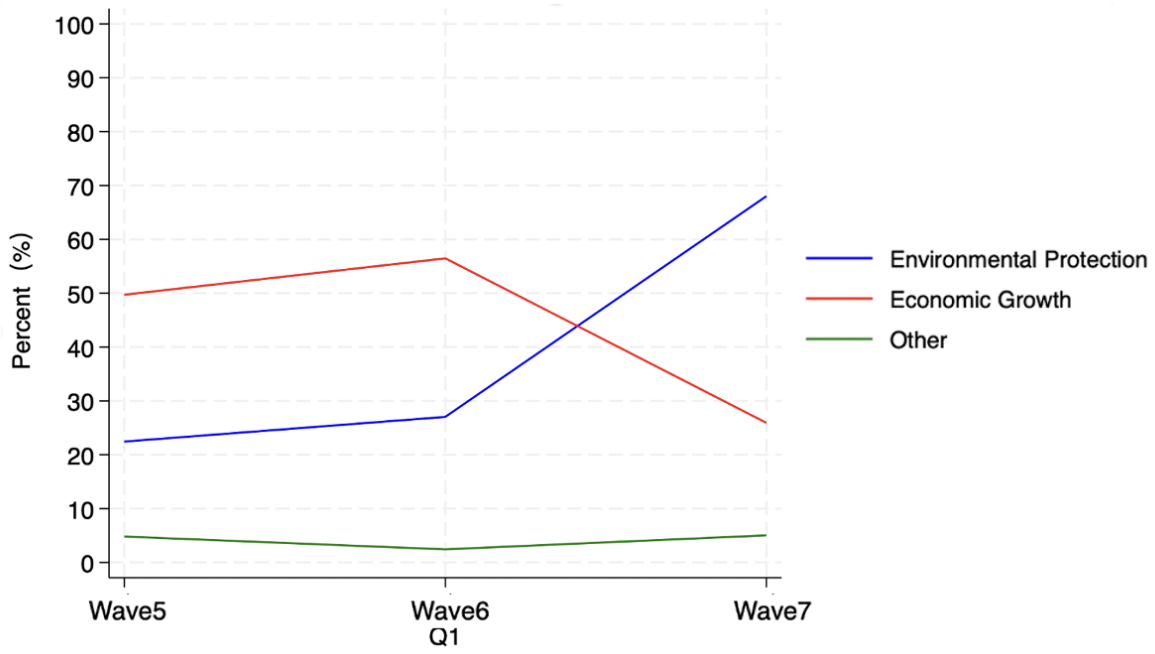
<b>Q1</b>	<b>Freq.</b>	<b>Percent</b>	<b>Cum.</b>
No Answer	119	5.17	5.17
Don't Know	204	8.87	14.04
Protect Environment	622	27.04	97.57
Economic Growth	1,299	56.48	70.52
Other Answer	56	2.43	100
<b>Q2</b>	<b>Freq.</b>	<b>Percent</b>	<b>Cum.</b>
No Answer	1	0.04	0.04
Don't Belong	2,238	97.3	97.35
Inactive Member	49	2.13	99.48
Active Member	12	0.52	100

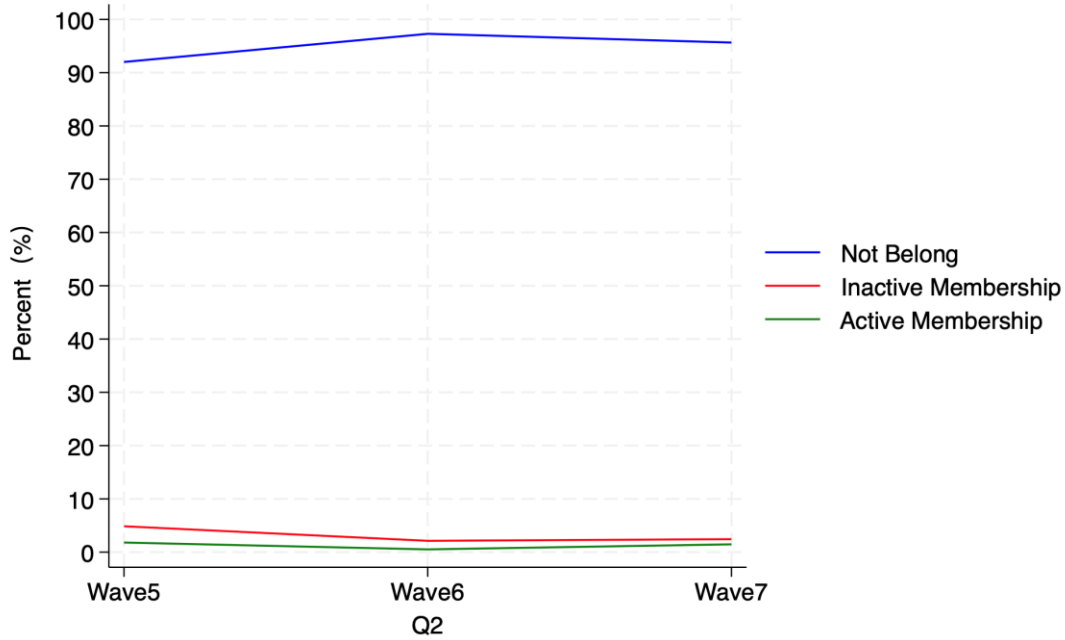
Wave 7

<b>Q1</b>	<b>Freq.</b>	<b>Percent</b>	<b>Cum.</b>
No Answer	16	0.53	0.53
Don't Know	15	0.49	1.02
Protect Environment	2,065	68.02	69.04
Economic Growth	787	25.92	94.96
Other Answer	153	5.04	100
<b>Q2</b>	<b>Freq.</b>	<b>Percent</b>	<b>Cum.</b>

No Answer	12	0.4	0.4
Don't Know	1	0.03	0.43
Don't Belong	2,904	95.65	96.08
Inactive Member	74	2.44	98.52
Active Member	45	1.48	100

Figure 1: Mainland China: Percent responses across waves





Graph 1: Mainland China: Percent responses across waves in line plots

Wave 5

Variable	Obs	Mean	Std. dev.	Min	Max
Q1	1,192	1.696	0.460	1	2
Q2	1,192	0.094	0.349	0	2
Age	1,192	43.536	13.258	18	70
Education	1,192	4.589	2.588	1	9
Income	1,192	4.075	1.848	1	10
Gender	1,192	1.517	0.500	1	2
Marital Status	1,192	1.154	0.361	1	2

Wave 6

Variable	Obs	Mean	Std. dev.	Min	Max
Q1	1,723	1.676	0.468	1	2
Q2	1,723	0.033	0.212	0	2
Age	1,723	43.143	14.701	18	75
Education	1,723	5.438	2.324	1	9

Income	1,723	4.478	1.851	1	10
Gender	1,723	1.499	0.500	1	2
Marital Status	1,723	0.826	0.379	0	1

Wave 7

Variable	Obs	Mean	Std. dev.	Min	Max
Q1	2,934	1.725	1.725	1	2
Q2	2,934	0.053	0.282	0	2
Age	2,934	44.610	14.486	18	70
Education	2,934	1.677	0.816	1	3
Income	2,934	1.657	0.529	1	3
Urban/Rural	2,934	1.376	0.484	1	2
Gender	2,934	1.549	0.498	1	2
Marital Status	2,934	1.188	0.391	1	2

Figure 2: Mainland China: Descriptive statistics of questions and demographics

Wave 5

	(1)	(2)	(3)
	Q1	Q2	Q3
Age	-0.001 (-0.441)	-0.002*** (-2.610)	-0.001* (-1.891)
Education	-0.001 (-0.124)	0.016*** (3.802)	0.008** (2.141)
Income	0.001 (0.120)	0.024*** (4.353)	0.012*** (2.661)
Gender	-0.012 (-0.419)	-0.005 (-0.231)	-0.008 (-0.471)
Marital Status	0.007 (0.190)	0.054* (1.903)	0.031 (1.273)
_cons	1.727***	-0.038	0.844***

	(16.767)	(-0.508)	(13.117)
N	1192	1192	1192
R-sq	0.000	0.061	0.025

Wave 6

	(1)	(2)	(3)
	Q1	Q2	Q3
Age	0.002** (2.315)	-0.001 (-0.313)	0.001** (1.985)
Education	0.029*** (5.131)	0.008*** (3.136)	0.019*** (5.982)
Income	-0.003 (-0.509)	0.004 (1.349)	0.000 (0.093)
Gender	-0.001 (-0.041)	-0.013 (-1.284)	-0.007 (-0.568)
Marital Status	-0.062** (-2.002)	-0.031** (-2.206)	-0.047*** (-2.739)
_cons	1.496*** (19.912)	0.023 (0.676)	0.760*** (18.463)
N	1723	1723	1723
R-sq	0.019	0.017	0.030

Wave 7

	(1)	(2)	(3)
	Q1	Q2	Q3
Age	0.001 (0.640)	0.001 (0.325)	0.001 (0.718)
Education	0.056*** (4.562)	0.015* (1.927)	0.036*** (4.908)
Income	0.018	-0.001	0.008

	(1.114)	(-0.132)	(0.874)
Urban/Rural	-0.021	-0.008	-0.015
	(-1.124)	(-0.720)	(-1.341)
Gender	-0.031*	0.009	-0.011
	(-1.847)	(0.872)	(-1.096)
Marital Status	-0.003	-0.002	-0.003
	(-0.110)	(-0.165)	(-0.183)
_cons	1.660***	0.024	0.842***
	(21.858)	(0.489)	(18.799)
N	2785	2785	2785
R-sq	0.015	0.002	0.015

Figure 3: Mainland China: Regression results

	(1)	(2)	(3)
	Q1	Q2	Q3
Age	-0.005***	-0.001**	-0.003***
	(-8.257)	(-2.082)	(-8.279)
Education	-0.076***	0.007***	-0.034***
	(-17.912)	(3.683)	(-14.581)
Income	-0.112***	0.003	-0.055***
	(-21.297)	(1.140)	(-18.671)
Gender	-0.042***	0.000	-0.021**
	(-2.632)	(0.023)	(-2.357)
Marital Status	0.097***	0.026***	0.062***
	(4.864)	(2.851)	(5.546)
_cons	2.930***	0.020	1.475***
	(55.755)	(0.830)	(50.452)
N	5849	5849	5849
R-sq	0.262	0.009	0.208

Figure 4: Mainland China: Aggregated regression results

## Appendix: Variable Names and Values

### Wave 5

Variable Name	Variable Code	Categories
<b>Dependent Variables</b>		
Q1	v104	Protecting Environment/Protecting Economic Growth
Q2	v29	Active Member/Inactive Member/Don't Belong
<b>Independent Variables</b>		
Age	v237	Number of Years
Income	v253	Ten Quantiles
Education	v238	1. No formal education 2. Incomplete primary school 3. Complete primary school 4. Incomplete secondary school: technical/vocational type 5. Complete secondary school: technical/vocational type 6. Incomplete secondary school: university-preparatory type 7. Complete secondary school: university-preparatory type 8. Some university-level education, without degree 9. University - level education, with degree
<b>Control Variables</b>		
Sex	v235	
Marital Status	v55	Male/Female, Male=1, Female=2 Married/Non-Married, Married=1, Non-Married=2

Note: Other categories include “No Answer,” “Not Asked,” “Do Not Know,” “Missing,” and so on, and they are excluded from regressions; Urban/Rural is not included in Wave 5.

### Wave 6

Variable Name	Variable Code	Categories
<b>Dependent Variables</b>		
Q1	v81	Protecting Environment/Protecting Economic Growth
Q2	v30	Active Member/Inactive Member/Don't Belong
<b>Independent Variables</b>		
Age	v242	Number of Years

Income	v239	Ten Quantiles
Education	v248	1. No formal education 2. Incomplete primary school 3. Complete primary school 4. Incomplete secondary school: technical/vocational type 5. Complete secondary school: technical/vocational type 6. Incomplete secondary school: university-preparatory type 7. Complete secondary school: university-preparatory type 8. Some university-level education, without degree 9. University - level education, with degree
Control Variables		
Sex	v240	
Marital Status	v57	Male/Female, Male=1, Female=2 Married/Non-Married, Married=1, Non-Married=2

Note: Other categories include “No Answer,” “Not Asked,” “Do Not Know,” “Missing,” and so on, and they are excluded from regressions; Urban/Rural is not included in Wave 6.

#### Wave 7

Variable Name	Variable Code	Categories
Dependent Variables		
Q1	Q111	Protecting Environment/Protecting Economic Growth
Q2	Q99	Active Member/Inactive Member/Don't Belong
Independent Variables		
Age	Q262	Number of Years
Income	Q275R	Lower/Middle/Higher
Education	Q288R	Low/Middle/High
Urban/Rural	H_URBRURAL 1	Urban/Rural, Urban=1, Rural=2
Control Variables		
Sex	Q260	Male/Female, Male=1, Female=2
Marital Status	Q273	Married/Non-Married, Married=1, Non-Married=2

Note: Other categories include “No Answer,” “Not Asked,” “Do Not Know,” “Missing,” and so on, and they are excluded from regressions.