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Introduction

This study uses the latest three waves of the transnational survey database World Values Survey to empirically investigate the relationships between environmental concern and a set of demographic variables relevant for the postmaterialist thesis including (1) age (2) education level (3) income and (4) urbanization in Mainland China. Responses on (1) priority over economic growth or environmental protection 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 aggregate regression with all the waves combined. Results show that age and education seem to be better "predictors" for environmental concern than the other demographic variables, in other words, the "socialization hypotheses" seem to work better than the "scarcity hypotheses" under the postmaterialist framework in Mainland China, a "natural laboratory" with large demographic variations and a "Confucian" background. The inconsistencies in how the demographic variables perform by question item and wave and the difference in the separate and aggregated regression results show the relevance of the "Asian uniqueness" argument. The example of environmental concern shows how citizens possessing liberal values and positive attitudes toward New Left issues in Mainland China can have diverse demographic backgrounds.

World Values Survey

I use Wave 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 Asian Barometer does not include such questions (2) some of the questions are referring to the tradeoffs between economic concerns and environmental concerns, e.g., contribution to environmental organization, tax increase for 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 on the "Asian uniquness" argument.

Existing Literature

While a number of studies on environmental movements in Mainland China can be found, they often focus on specific cities such as Xiamen and Nanjing, and incidents such as the protests against construction of power plants and factories (Brunner, E., 2017; Brunner, E. and Li, H., 2018; Grano, S. A. and Zhang, Y., 2016). There is not much research that investigate environmental concern in Mainland China with standardized survey data. Also, although research that use social media data exist, which often discuss state censorship, authoritarian regime, social stability, and media (Joseph, J. and Karackattu, J. T., 2022; Liu, J., 2016; Sheng, C. 2019).

To sum, few studies (1) look at environmental awareness in Mainland China, and they mostly look at environmental protests (2) use standardized survey data such as the WVS to look at environmental protests (3) apply the latest wave of the WVS, and (4) use Mainland China as a case study to discuss the "Asian uniqueness" argument under the postmaterialist framework. This study can fill these research gaps and uses question items in the latest waves of the WVS and shed light on the "Asian uniqueness" argument.

After explaining the dimensional or spatial differences in conceptualizing "environmentalism" and discussing the choice of data and survey items, I aim to (1) look at the descriptive statistics of the response categories and their longitudinal changes across the three waves, (2) regress the responses separate for the three waves with a set of demographic indicators, i.e., age, income, education, and urbanization, and (3) inspect on the regression results and see to what extent the "scarcity hypothesis" and "socialization hypothesis" can be generalized to Mainland China, i.e., whether expected patterns in the hypotheses can be found. (4) After conducting the regressions separately for the three waves to see longitudinal differences for the correlations, I combine the three waves and look at the general picture and static image of or "snapshot" of Mainland China and see whether differences exist in the separate and aggregated regression results.

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 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 does not distinguish between geographical levels for the respondents' concern for the "environment." While 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 local, national, or the global environment. Concern for 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, and 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 into 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, if such factories or research centers are located in certain neighborhoods and if the solar panels and wind turbines are placed 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 conspiratory and 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 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 to 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 asked seems to employ a stricter standard for environmental awareness. For some cases, questions and responses are the same, such as for membership of environmental organization (Active/Inactive/Not Belong). Also, while Wave 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 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 if it is about an authoritarian regime with high political and economic risks of being arrested or disadvantaged in various ways for joining a demonstration.

I note that 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, signed petitions aimed at protecting the environment.” Compared to Wave 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 environmenal concern, such as recycling, water consumption, and eco-products. I note that there are studies such as Engel and Potschke (2012) that follows the behavioral science stream and specifically analyze economic behaviors such as willingness to pay for 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 the 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 positiong of this anslysis 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 and (2) on the dependent variables side, I do not look at economic behaviors such as consumption, donation, and willing to pay. (3) I also do not look at how environmental concern translate into environmental movements such as protests.

Question Items

To start with, Wave 5 includes the following 5 question items. (1) Active/inactive membership in environmental organization (2) question on protecting 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 (5) Government should reduce environmental pollution. Wave 6 includes the following question items. (1) Active/inactive membership in environmental organization (2) Protecting environment vs. economic growth. (3) Given money to an ecological organization in the past 2 years (4) Participated in a demonstration for the environment in the past 2 years. Wave 7 includes the following question items. (1) Active/inactive membership in environmental organization (2) Protecting environment vs. economic growth. We could see that the following two question items (1) question on protecting environment vs. economic growth and (2) active/inactive membership in environmental organization are in place for all the three waves in the Greater China area. The response categories for the latter include (1) Active (2) Inactive (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 in something between. Whether self-identified as active or inactive can be rather personal, as no specific questions on the number of events participated, how much time spent, or how much money 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?” and the response categories include (1) Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs and (2) Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent (3) Other. We could 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, 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 would give/have contributed money, i.e., environmental tendency or action and on whether 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, the 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 dabatase.

Demographic Variables

Demographic variables that are considered most relevant to the “scarcity hypothesis” and “socialization hypothesis” including (1) age (2) income (3) education and (4) urbanization are the independent variables. The two questions items on environmental action and awareness action shared by the three waves are the dependent variables. Question on protecting environment vs. economic growth is coded Q1 and question on active/inactive membership in 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) are 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 Wave 5 and 6 and the three quantiles (1) Lower (2) Middle (3) Higher for Wave 7. Regarding age, it is the number of years for all the three waves. Regarding education, I use the nine levels from no formal education to university level with degree for Wave 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 Wave 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 that it does not necessarily reflect the level of urbanization 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 Wave 5 and 6. Regarding Q1 and Q2, the question wording and response categories are all the same for the three waves.

I make a summary of the names and categories of all the variables used in this analysis for each wave (each wave has a different labelling and coding system) in 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 with specific languages can also be found on its sub-websites. I mostly follow the original coding except for some cases where simplifications are needed for regressions such as combing categories for marital status as a control variable. Any variable, whether dependent or independent, which has these null answers such as "No Answer," "Not Asked," "Do Not Know," and "Missing" are 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. In the case of marital status, although response categories of (1) Married (2) Living together as married (3) Divorced (4) Separated (5) Widowed (6) Single are included in the WVS in all the three waves, and 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 response has 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 can have some kind of relationship with the number of children in the household or having or not having kid, but such 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 can be made. In the case of religion and religiosity, since Mainland China shows a variety of folk religions 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 of Wave 5, 6, and 7 are 1192, 1723, and 2934, which increases over time, perhaps increasing sample validity. In Figure 1, (1) we could see from the distribution of Q1 that, for Wave 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 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 for 5% Wave 7. (2) We could 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 increase trend for the percentage of active members or a decrease trend for the percentage of inactive members across the three waves. Actually, the percentage of active members slight decreases from Wace 5 to 6, and inactive members slightly increases from Wave 6 to 7.

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 could see that for Q1, we do see 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 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 could see the descriptive statistics of all the demographic variables, and that for the three waves in this analysis, age, education, and income have quite a large

distribution, and compared to Q1 and Q2, we do not see large concentrations on one side in the distribution for the demographic indicators. We could see that both males and females make up the sample, and there is no concentration on one gender for all the 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 asks about environmental protection/economic growth and environmental organization membership. Q3 is a combination of Q1 and Q2 and can be named as "attitude to environmentalism index." This index is a calculated as a mean, and it is 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 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 with Q2. Figure 3 shows the results of the regressions for Mainland China.

I inspect on 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 the 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 factors I consider is the level of urbanization. I focus on both scarcity and socialization hypnoses.

I hypothesize that (1) Age is negative 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 than rural areas should show more environmental concern. 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 (4) on education are more about the "socialization hypothesis" and (2) and (3) on household income and urbanization (economic indicators for individual and regional levels) are more about the "scarcity hypothesis." Therefore, there are four main hypotheses for which I would like to test in the postmaterialist thesis.

Regression Results

In Figure 3, we could 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 sign of 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 significances 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, 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 could 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 has 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 could 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 absurd result. Also, age conforms to the expected direction for Q2 but without statistical significance. (2) Education both shows the expected direction of correlation for both question items and the overall index and carries statistical significance. This results here supports 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 to be 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, 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 significances 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 scarcity hypothesis with regard to income is not supported. The poor performance of income here is in contrast with Wave 5.

We could see for Wave 7 that (1) Age does not conform to the expected direction, and there are no statistical significances. (2) Education both conforms to the expected direction and carry statistical significances 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 are no statistical significances. (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 sign of direction should be negative. Also, it does not carry statistical significances for both question items and the overall index. If we look 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 economy. To sum, 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 do 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 scarcity hypotheses with regard to income and urbanization are not supported.

Looking at the three latest waves in the WVS for Mainland China, we could see that (1) While income seems to be the best performer for Wave 5, it is not for Wave 6 and 7. In other words, the scarcity hypothesis with regard to income only holds for Wave 5. (2) Education keeps being a good performer for all the three waves, and if we look at the overall index, education shows the expected direction and strong statistical significance, indicating that socialization hypothesis with regard to education work 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 Wave 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 socialization hypothesis based on education seems to apply well to Mainland China, socialization hypothesis based on age does not apply as well. Also, scarcity hypothesis based on income does not seem to apply well to Mainland China, and scarcity hypothesis based on urbanization does not seem to apply well too 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 Wave 5 and 6. Figure 4 shows the aggregated regression results for Mainland China combing the three waves. We could 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 could 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 that 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, but different from the separate regressions, education no longer seem 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 socialization hypothesis with regard to age is supported, and 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 could notice that gender seems to be negatively correlated with Q1 and the overall index with statistical significances, which is similar to what is observed in Wave 7. If we look at Q2, while gender does not seem to correlate with Q2 at all, marital status does correlate with Q2 with statistical significance. If we look at marital status, the positive correlations with statistical significances of marital status with Q1, Q2, and the overall index is 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 be 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, and these control variables are not the focus of the postmaterialist thesis.

Discussion Points

The discrepancies that exists in the performance of the demographic variables across question items and waves and the differences between the results of the separate regressions and the combined regressions as well as the opposite effects of some demographic variables compared to the expected hypotheses raise questions suggest the relevance of the “Asian uniqueness” argument in the case of Mainland China and whether there are 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, and we can see if the "socialization hypotheses" also perform better than "scarcity hypotheses." Also, we can compare with some developing and underdeveloped societies such as those in Southeast Asia, Africa, and Latin America to see their conformities to the postmaterialist hypotheses. One example of environmental studies that focus on individual underdeveloped regions is Yogo (2011) which looks at Africa and incorporates the social capital concept, including the information and peer effects in analyzing the willingness to pay. Other examples that discuss environmental policies and public sentiments include Bhattachaeryya (2007) which looks at South Asia and Albizua and Zografos (2014) which look at Spain. However, such global comparison is beyond the scope of this analysis.

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

Also, I use the survey results for granted, but a common question about survey analysis is to what degree biases such as the "social desirability bias" exist and the difference in the size of such bias across the societies being compared. The size of such bias can only be compared through manipulating different questions for the same respondents on a topic. Also, differences in cognitive capabilities and forms can exist across individuals as well as across cultural groupings. Different cultural settings can make the respondents perceive the questions and response categories including the wordings and translated wordings in slightly different ways. Respondents across societies may have different understanding of the word "environmentalism" itself, and there may not be universal agreement on its definition, but such nuance can be ignored. Also, 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, i.e., those think they themselves actively participate 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.

Third, more sophisticated regression models can be employed such as those with more control variables. Some examples of other variables to include the number of children, number of siblings, parents' education and income, and party membership in the CCP as well as some macro and exogeneous factors that capture some life-cycle effects such as economic levels,

economic growths, inequalities, and inflations, media coverage on environmental issues, movements of domestic and international NGOs and NPOs on environmental issues, and even the COVID-19 policies (given that the COVID-19 pandemic happened during Wave 7). Also, I assume independent effects between Q1 and Q2 in the regressions, but there may be interaction effects which can be taken into account. Also, the concentration of non-membership for Q2 and the low variation can undermine the regression results for Q2. To increase the variation, the WVS can be combined with data on similar questions from other relevant survey databases or even original and tailored survey.

Would regression results change if we use or combine with other samples with similar question items? Will the regression results change if we incorporate other control variables? Do the inconsistencies found in this analysis mean "Asian uniqueness" or simply that the samples are biased? Or is the postmaterialist thesis in the first place is not good? There are perhaps three possibilities (1) there is "Asian uniqueness" as this analysis suggest, (2) there is no "Asian uniqueness" if we use or combine with other samples, and (3) the postmaterialist thesis is not good. It is not possible to look at (2) and (3) without referring to other samples and research methods and compare to a larger set of societies. Furthermore, "age" in the regression model may not necessarily reflect generational replacements but some life-cycle effects, which may not be in line with the socialization hypothesis in the original postmaterialist framework focuses on generational replacement.

Lastly, while regression results are discussed, qualitative explanations on why overall education seems to perform better than other demographic indicators, why income only perform well for Wave 5 but not others, why discrepancies in the direction of correlations across question items, and waves exist, why for the aggregated regression with combined waves only age performs well, which is different from the separated 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. Maybe some macro factors, historical background as well as changes in environmental policies can be discussed and perhaps compared with the other regions in the Greater China area and East Asia, such as the modernization and democratization trajectories.

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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
Q2	Freq.	Percent	Cum.
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

Q1	Freq.	Percent	Cum.
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

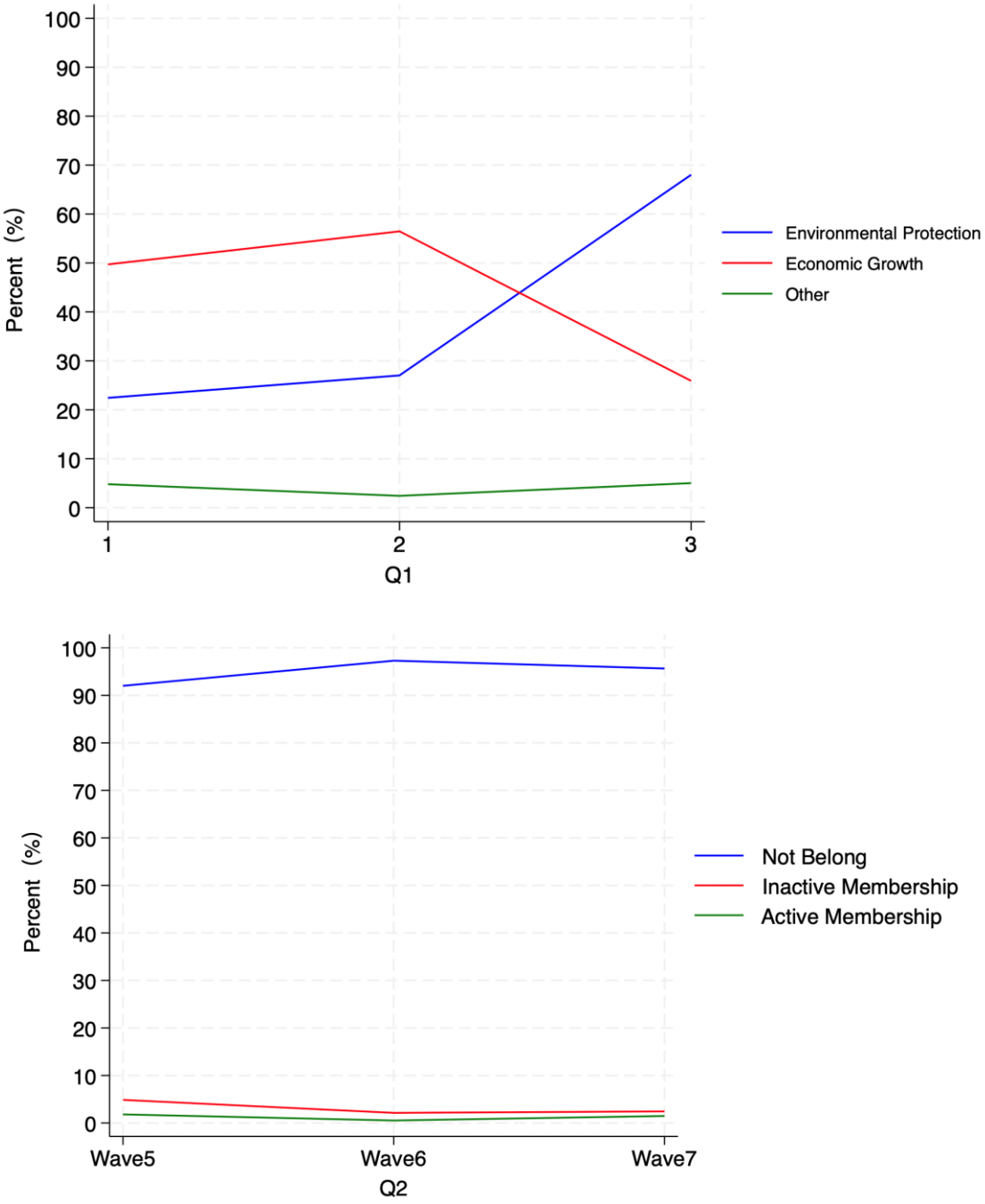
Q2	Freq.	Percent	Cum.
No Answer	1	0.04	0.04
Don’t Belong	2,238	97.3	97.35
Inactive Member	49	2.13	99.48
Active Member	12	0.52	100

Wave 7

Q1	Freq.	Percent	Cum.
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

Q2	Freq.	Percent	Cum.
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	-0.002***	-0.001*
	(-0.441)	(-2.610)	(-1.891)
Education	-0.001	0.016***	0.008**
	(-0.124)	(3.802)	(2.141)
Income	0.001	0.024***	0.012***
	(0.120)	(4.353)	(2.661)
Gender	-0.012	-0.005	-0.008
	(-0.419)	(-0.231)	(-0.471)
Marital Status	0.007	0.054*	0.031
	(0.190)	(1.903)	(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**	-0.001	0.001**

	(2.315)	(-0.313)	(1.985)
Education	0.029***	0.008***	0.019***
	(5.131)	(3.136)	(5.982)
Income	-0.003	0.004	0.000
	(-0.509)	(1.349)	(0.093)
Gender	-0.001	-0.013	-0.007
	(-0.041)	(-1.284)	(-0.568)
Marital Status	-0.062**	-0.031**	-0.047***
	(-2.002)	(-2.206)	(-2.739)
_cons	1.496***	0.023	0.760***
	(19.912)	(0.676)	(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	0.001	0.001
	(0.640)	(0.325)	(0.718)
Education	0.056***	0.015*	0.036***
	(4.562)	(1.927)	(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: Aggregared Regression Results

Appendix: Variable Names and Values

Wave 5

Variable Name	Variable Code	Categories
Dependent Variables		Protecting Environment/Protecting
Q1	v104	Economic Growth
Q2	v29	Active Member/Inactive Member/Don't Belong
Independent Variables		
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
Control Variables		
Sex	v235	Male/Female
Marital Status	v55	Married/Non-Married

Note: Other categories includes "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
Dependent Variables		Protecting Environment/Protecting
Q1	v81	Economic Growth
Q2	v30	Active Member/Inactive Member/Don't Belong
Independent Variables		

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	Male/Female
Marital Status	v57	Married/Non-Married

Note: Other categories includes "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
Q2	Q99	Economic Growth 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
Control Variables		
Sex	Q260	Male/Female
Marital Status	Q273	Married/Non-Married

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