

Reply to Referee Report on “Governance, vulnerability to climate change, and green growth: international evidence” – MS 2140

Assessment:

This study represents an extremely minor addition to past studies on the topic; their contribution is the addition of a measure of Vulnerability to Climate Change. However, after reading the manuscript, I fail to see the theoretical causal connection between how a change in a country’s vulnerability to climate change would result in a change in its concentrations of PM2.5 (a local air pollutant not related to anthropogenic climate change). I do not think you can draw any conclusions about policy implications without first justifying that there is, at the very least, a theoretical causal connection.

Response:

We thank the referee for the comment. We actually discussed about the vulnerability to climate change and their theoretical linkage with environmental quality/performance of a country on page 8 of our manuscript. We will try to look for further theories/evidence to improve this part when we revise this manuscript.

There are also several other major issues that I outline in comments below.

1. I am concerned about potential incidental plagiarism in the Literature Review and possibly throughout the rest of the paper. The authors’ often attempt to paraphrase, but only change one or two words, resulting in sentences that are too close to what is written in the original source.

For example, on page 5, the authors’ state “Wood and Herzog (2014) assert that economic freedom, one measure of the quality of economic institutions, plays a critical role in the linkage between economic development and environmental quality. Failure to incorporate this factor in economic models of pollution could thus cause spurious results.”

These two sentences are too similar to what Wood and Herzog (2014) wrote:

“...that economic freedom (a measure of the quality of economic institutions) plays a particularly important role in the causal relationship between economic development and environmental quality. Failing to account for it in economic models of pollution can lead to spurious results.” (Page 5 of Wood and Herzog (2014))

This problem occurs again on Page 6 where the authors’ write:

“...refers to how freer trade increases output, which in turn increases pollution. More trade also changes the composition of industry, which can have either a positive or negative effect on pollution, depending on factor endowments. Antweiler et al. (2001) showed that freer trade can lead to an overall cleaner environment for some pollutants.”

These three sentences share too much in common with sentences in paragraph 2 and 3 on page 7 of Wood and Herzog (2014):

“ ...refers to how freer trade leads to increased output, which in turn leads to more pollution, all else equal.”

“...more trade also leads to a change in the composition of industry, which, depending on factor endowments, can have a positive or negative effect on pollution.”

“Freer trade can lead to an overall cleaner environment for some pollutants...”

I would recommend that the authors review guidelines on how to properly paraphrase. These are just the specific instances that I noticed, but it may be an issue throughout the paper.

Response:

We apologize for this potential incidental plagiarism in the Literature review of our manuscript. As pointed out by the referee, we did attempt to paraphrase the content we wanted to cite in the references. However, please understand that we did not do that by only changing one or two words, as shown in the two cases that are closest to the original sources as indicated in the referee’s comment.

Nevertheless, following the referee’s suggestion, we have indeed looked at the guidelines on paraphrasing provided by MIT and some other reliable sources and we admitted that for several places in our manuscript, our paraphrasing could be improved to avoid the confusion on incidental plagiarism. We will review the guidelines on paraphrasing as advised by the referee and we will follow these guidelines to revise our manuscript thoroughly to address this issue.

2. On page 7, paragraph 3, the authors’ state: “While these studies acknowledge that corruption, political institutions, or social structure are instrumental in accurately measuring the connection between economic activity and environmental quality, they do not fully account for those factors in their analysis (see, for example, Panayotou, 1997; Barret and Grady, 2000; Bhattarai and Hammig, 2001; Bernauer and Koubi, 2009; Leita0, 2010; Lin and Liscow, 2013). As such, our study contributes to the literature by more explicitly incorporating governance into the empirical analysis.”

First: This paragraph bears many similarities to sentences in paragraph 3 on page 1 of Wood and Herzog (2014).

Second: The claim is false and indicates that the authors’ did not read the papers cited in sufficient detail. For example, Bernauer and Koubi (2009) control for the quality of governance using the Polity index. Wood and Herzog (2014) include both the Economic Freedom of the World index and the Polity index in their regression specifications.

Third: The authors’ of the paper under review then decide on page 10, without reference to what was done in the previous literature, that they choose the “Index of Economic Freedom as a proxy for the governance”; if anything, it is the current authors’ who “do not fully account for” corruption, political institutions, or social structure. This also highlights that their contribution is purely adding an indicator of vulnerability to climate change to the analysis.

Response:

First, we include these studies in our overall assessment of the existing literature in this field because they are representative studies.

In our statement, we are in line with Wood and Herzog (2014) that most of the studies in this field do not wholly control for all the factors including: corruption, political institutions and social structure. For instance, Bernauer and Koubi (2009) employed a measure of the degree of democracy (winning coalition over the selectorate) in order to examine the critical role of political structures in determining levels of pollution, instead of using other conventional measures of democracy like the Freedom House political liberties index and Polity IV data.

As compared to this index, our two measures of governance quality are more comprehensive. Specifically, we employed the Economic Freedom Index as our main measure and the Government Effectiveness as a second measure for robustness check.

Our main measure of governance quality: Economic Freedom Index is constructed based on 12 quantitative and qualitative factors, which can be sorted into four broad pillars of economic freedom, as follows:

- *Rule of Law (property rights, government integrity, judicial effectiveness)*
- *Government Size (government spending, tax burden, fiscal health)*
- *Regulatory Efficiency (business freedom, labor freedom, monetary freedom)*
- *Open Markets (trade freedom, investment freedom, financial freedom)*

(Source: the Index of Economic Freedom, an annual guide published by The Heritage Foundation, Washington's No. 1 think tank)

As such, by using this index in our study, we bring in an analysis with a comprehensive measure which covers many aspects of governance quality including corruption, political institutions and social structure.

Our second measure for robustness check: Government effectiveness “captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies”.

(Quoted from World Bank’s description of the index).

Please note that we did not mention Wood and Herzog (2014) in this example list of our statement as in the comment since this study addresses this shortcoming in the existing literature by employing two measures: The Economic Freedom Index and the Polity Index in their study.

3. Page 10: The author’s state “The novelty of this structure is to explicitly consider the possible impact of the level of energy consumption on the relationship between governance, vulnerability to climate change and air quality”. There are 1000s of EKC studies, I find it difficult to believe that this is the first study that included adding energy consumption to the regressions.

Response:

The referee is right. There are a handful of studies on EKC hypotheses and many of them embedded energy consumption in the regressions to examine the growth-environment nexus. However, by this statement, we do not imply that our novelty lies in this angle. What we meant is explicitly indicated in the statement. Specifically, we regard that adding energy consumption would help to better examine the linkages between our three variables including governance quality, vulnerability to climate change and air quality. We believe studies on the relationships among these four variables have not been conducted in the literature.

4. Page 16: The authors' mention Granger causality, however, their regression model on page 9 is not a dynamic panel data model, so they cannot test for Granger "causality".

Response:

The referee is right. However, we do not conduct Granger causality test in our study. In our manuscript, Granger causality test only appeared in the statement "by pooling the time series data across countries, panel data allows for more observations and leads to higher power for the Granger causality test" and this is to discuss why conducting panel data analysis is superior to using time-series data analysis.

5. Wood and Herzog (2014) highlight potential endogeneity between variables and estimate both an OLS model and a GMM-IV model; whereas, the authors' of the present study do not address the issue other than through testing for multi-collinearity. Furthermore, the authors' of the current study ignore the possibility of a non-linear relationship between income and PM2.5, despite the fact that Wood and Herzog (2014) find a non-linear relationship between income and PM10.

Response:

We thank the referee for this helpful suggestion. First, we did conduct the endogeneity test for our panel data and we found no significant evidence of endogeneity among the variables of interest at conventional levels. As such, we employed Driscoll and Kraays' (1998) standard errors produced by the xtsc program presented in Hoechle (2007) for our linear panel models due to its superiors including heteroscedasticity consistency. Besides, this estimation accounts for cross-sectional dependence problems and corrects for auto-correlation of any order.

With regard to the potential non-linear relationship between income and PM2.5, we had actually conducted our whole regressions including the square of income level. However, in all cases, we found the coefficients of this variable insignificant, indicating that there is no non-linear relationship between income and air quality variable in our study. As such, we have

decided to take out this squared income variable in our study so as not to make it simply another EKC study. We will provide the results of these regressions if requested.

6. Page 19: The effect of the Governance variable is only statistically significant for the high-income sub-sample. The failure to reject the null that the coefficients are zero in the other sub-samples of countries raises questions about the robustness of your conclusions. Basically you are unable to identify an effect for changes in economic freedom on changes in concentrations for the other sub-samples of countries. This suggests to me that it is not economic freedom that matters, but maybe something else that only the high income countries have? Though it could just be a product of restricting the sample too much or of looking at changes in economic freedom rather than levels.

Response:

Please note that our analysis across groups of countries with different income levels is not a robustness attempt. Instead, we want to see how the impacts of governance quality and vulnerability to climate change vary across these groups. As shown in our study, we find different results across these groups and suggest different implications for countries with different income levels.

As mentioned in our study, our robust exercise in this study is conducted based on different measures of governance, vulnerability to climate change, and environmental performance.

7. Table 3 on page 20 and 21: This table is extremely difficult to read. The authors' need to reformat them: All cells should not have borders.

Response:

We thank the referee for the comment. We admit that since the content in Table 3 is way too much, the length of its presentation makes it difficult to comprehend. We will find a way to reformat the Table to make it easier to read. In addition, we will make sure to remove the borders according to the referee's suggestion.